Operating instructions

EN

Welding machine

Microplasma 25-2
Microplasma 55-2
Microplasma 105-2
Microplasma 25-2 PG
Microplasma 55-2 PG
Microplasma 105-2 PG

099-007030-EW501 | Observe additional system documents! | 18.08.2020

General instructions

⚠ WARNING

Read the operating instructions!

The operating instructions provide an introduction to the safe use of the products.

- Read and observe the operating instructions for all system components, especially the safety instructions and warning notices!
- Observe the accident prevention regulations and any regional regulations!
- The operating instructions must be kept at the location where the machine is operated.
- Safety and warning labels on the machine indicate any possible risks.
  Keep these labels clean and legible at all times.
- The machine has been constructed to state-of-the-art standards in line with any applicable regulations and industrial standards. Only trained personnel may operate, service and repair the machine.
- Technical changes due to further development in machine technology may lead to a differing welding behaviour.

In the event of queries on installation, commissioning, operation or special conditions at the installation site, or on usage, please contact your sales partner or our customer service department on +49 2680 181-0.

A list of authorised sales partners can be found at www.ewm-group.com/en/specialist-dealers.

Liability relating to the operation of this equipment is restricted solely to the function of the equipment. No other form of liability, regardless of type, shall be accepted. This exclusion of liability shall be deemed accepted by the user on commissioning the equipment.

The manufacturer is unable to monitor whether or not these instructions or the conditions and methods are observed during installation, operation, usage and maintenance of the equipment.

An incorrectly performed installation can result in material damage and injure persons as a result. For this reason, we do not accept any responsibility or liability for losses, damages or costs arising from incorrect installation, improper operation or incorrect usage and maintenance or any actions connected to this in any way.

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1 Contents

2 For your safety

2.1 Notes on using these operating instructions

⚠ DANGER

Working or operating procedures which must be closely observed to prevent imminent serious and even fatal injuries.

- Safety notes include the "DANGER" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol on the edge of the page.

⚠ WARNING

Working or operating procedures which must be closely observed to prevent serious and even fatal injuries.

- Safety notes include the "WARNING" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol in the page margin.

⚠ CAUTION

Working or operating procedures which must be closely observed to prevent possible minor personal injury.

- The safety information includes the "CAUTION" keyword in its heading with a general warning symbol.
- The risk is explained using a symbol on the edge of the page.

☞ ***Technical aspects which the user must observe to avoid material or equipment damage.***

Instructions and lists detailing step-by-step actions for given situations can be recognised via bullet points, e.g.:

- Insert the welding current lead socket into the relevant socket and lock.

2.2 Explanation of icons

Symbol	Description	Symbol	Description
	Indicates technical aspects which the user must observe.		Activate and release / Tap / Tip
	Switch off machine		Release
	Switch on machine		Press and hold
			Switch
	Incorrect / Invalid		Turn
	Correct / Valid		Numerical value – adjustable
	Input		Signal light lights up in green
	Navigation		Signal light flashes green
	Output		Signal light lights up in red
	Time representation (e.g.: wait 4 s / actuate)		Signal light flashes red
	Interruption in the menu display (other setting options possible)		
	Tool not required/do not use		
	Tool required/use		

2.3 Part of the complete documentation

This document is part of the complete documentation and valid only in combination with all other parts of these instructions! Read and observe the operating instructions for all system components, especially the safety instructions!

The illustration shows a general example of a welding system.

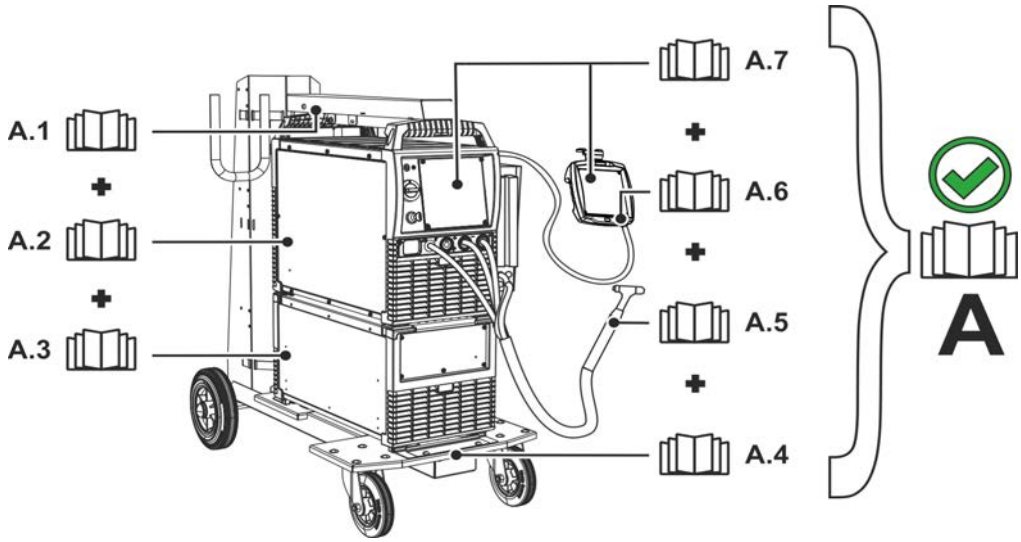


Figure 2-1

Item	Documentation
A.1	Options conversion instructions
A.2	Power source
A.3	Cooling unit, voltage converter, tool box etc.
A.4	Transport cart
A.5	Welding torch
A.6	Remote control
A.7	Controller
A	Complete documentation

2.4 Safety instructions

⚠ WARNING

Risk of accidents due to non-compliance with the safety instructions!

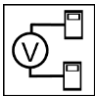
Non-compliance with the safety instructions can be fatal!

- Carefully read the safety instructions in this manual!
- Observe the accident prevention regulations and any regional regulations!
- Inform persons in the working area that they must comply with the regulations!

Risk of injury from electrical voltage!

Voltages can cause potentially fatal electric shocks and burns on contact. Even low voltages can cause a shock and lead to accidents.

- Never touch live components such as welding current sockets or stick, tungsten or wire electrodes!
- Always place torches and electrode holders on an insulated surface!
- Wear the full personal protective equipment (depending on the application)!
- The machine may only be opened by qualified personnel!
- The device must not be used to defrost pipes!



Hazard when interconnecting multiple power sources!

If a number of power sources are to be connected in parallel or in series, only a technical specialist may interconnect the sources as per standard IEC 60974-9:2010: Installation and use and German Accident Prevention Regulation BVG D1 (formerly VBG 15) or country-specific regulations.

Before commencing arc welding, a test must verify that the equipment cannot exceed the maximum permitted open circuit voltage.

- Only qualified personnel may connect the machine.
- When taking individual power sources out of operation, all mains and welding current leads must be safely disconnected from the welding system as a whole. (Hazard due to reverse polarity voltage!)
- Do not interconnect welding machines with pole reversing switch (PWS series) or machines for AC welding since a minor error in operation can cause the welding voltages to be combined, which is not permitted.

Risk of injury due to improper clothing!

During arc welding, radiation, heat and voltage are sources of risk that cannot be avoided. The user has to be equipped with the complete personal protective equipment at all times. The protective equipment has to include:

- Respiratory protection against hazardous substances and mixtures (fumes and vapours); otherwise implement suitable measures such as extraction facilities.
- Welding helmet with proper protection against ionizing radiation (IR and UV radiation) and heat.
- Dry welding clothing (shoes, gloves and body protection) to protect against warm environments with conditions comparable to ambient temperatures of 100 °C or higher and arcing and work on live components.
- Hearing protection against harming noise.

⚠ WARNING

Risk of injury due to radiation or heat!
Arc radiation can lead to skin and eye injuries.
Contact with hot workpieces and sparks can lead to burns.

- Use hand shield or welding helmet with the appropriate safety level (depends on the application).
- Wear dry protective clothing (e.g. hand shield, gloves, etc.) in accordance with the applicable regulations of your country.
- Persons who are not directly involved should be protected with a welding curtain or suitable safety screen against radiation and the risk of blinding!

Explosion risk!
Apparently harmless substances in closed containers may generate excessive pressure when heated.

- Move containers with inflammable or explosive liquids away from the working area!
- Never heat explosive liquids, dusts or gases by welding or cutting!

Fire hazard!
Due to the high temperatures, sparks, glowing parts and hot slag that occur during welding, there is a risk of flames.

- Be watchful of potential sources of fire in the working area!
- Do not carry any easily inflammable objects, e.g. matches or lighters.
- Ensure suitable fire extinguishers are available in the working area!
- Thoroughly remove any residue of flammable materials from the workpiece prior to starting to weld.
- Only further process workpieces after they have cooled down. Do not allow them to contact any flammable materials!

⚠ CAUTION

Smoke and gases!

Smoke and gases can lead to breathing difficulties and poisoning. In addition, solvent vapour (chlorinated hydrocarbon) may be converted into poisonous phosgene due to the ultraviolet radiation of the arc!

- Ensure that there is sufficient fresh air!
- Keep solvent vapour away from the arc beam field!
- Wear suitable breathing apparatus if appropriate!

Noise exposure!

Noise exceeding 70 dBA can cause permanent hearing damage!

- Wear suitable ear protection!
- Persons located within the working area must wear suitable ear protection!

According to IEC 60974-10, welding machines are divided into two classes of electromagnetic compatibility (the EMC class can be found in the Technical data) > *see 8 chapter*:

Class A machines are not intended for use in residential areas where the power supply comes from the low-voltage public mains network. When ensuring the electromagnetic compatibility of class A machines, difficulties can arise in these areas due to interference not only in the supply lines but also in the form of radiated interference.

Class B machines fulfil the EMC requirements in industrial as well as residential areas, including residential areas connected to the low-voltage public mains network.

Setting up and operating

When operating arc welding systems, in some cases, electro-magnetic interference can occur although all of the welding machines comply with the emission limits specified in the standard. The user is responsible for any interference caused by welding.

In order to **evaluate** any possible problems with electromagnetic compatibility in the surrounding area, the user must consider the following: (see also EN 60974-10 Appendix A)

- Mains, control, signal and telecommunication lines
- Radios and televisions
- Computers and other control systems
- Safety equipment
- The health of neighbouring persons, especially if they have a pacemaker or wear a hearing aid
- Calibration and measuring equipment
- The immunity to interference of other equipment in the surrounding area
- The time of day at which the welding work must be carried out

Recommendations for **reducing interference emission**

- Mains connection, e.g. additional mains filter or shielding with a metal tube
- Maintenance of the arc welding system
- Welding leads should be as short as possible and run closely together along the ground
- Potential equalization
- Earthing of the workpiece. In cases where it is not possible to earth the workpiece directly, it should be connected by means of suitable capacitors.
- Shielding from other equipment in the surrounding area or the entire welding system

Electromagnetic fields!

The power source may cause electrical or electromagnetic fields to be produced which could affect the correct functioning of electronic equipment such as IT or CNC devices, telecommunication lines, power cables, signal lines and pacemakers.

- Observe the maintenance instructions > *see 6.2 chapter*!
- Unwind welding leads completely!
- Shield devices or equipment sensitive to radiation accordingly!
- The correct functioning of pacemakers may be affected (obtain advice from a doctor if necessary).

⚠ CAUTION

Obligations of the operator!
The respective national directives and laws must be complied with when operating the machine!

- Implementation of national legislation relating to framework directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work and associated individual guidelines.
- In particular, directive 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work.
- The regulations applicable to occupational safety and accident prevention in the country concerned.
- Setting up and operating the machine as per IEC 60974.-9.
- Brief the user on safety-conscious work practices on a regular basis.
- Regularly inspect the machine as per IEC 60974.-4.

☞ ***The manufacturer's warranty becomes void if non-genuine parts are used!***

- ***Only use system components and options (power sources, welding torches, electrode holders, remote controls, spare parts and replacement parts, etc.) from our range of products!***
- ***Only insert and lock accessory components into the relevant connection socket when the machine is switched off.***

Requirements for connection to the public mains network

High-performance machines can influence the mains quality by taking current from the mains network. For some types of machines, connection restrictions or requirements relating to the maximum possible line impedance or the necessary minimum supply capacity at the interface with the public network (Point of Common Coupling, PCC) can therefore apply. In this respect, attention is also drawn to the machines' technical data. In this case, it is the responsibility of the operator, where necessary in consultation with the mains network operator, to ensure that the machine can be connected.

2.5 Transport and installation

⚠ WARNING

Risk of injury due to improper handling of shielding gas cylinders!
Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!

- Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
- Do not attach any element to the shielding gas cylinder valve!
- Prevent the shielding gas cylinder from heating up.

⚠ CAUTION

Risk of accidents due to supply lines!

During transport, attached supply lines (mains leads, control cables, etc.) can cause risks, e.g. by causing connected machines to tip over and injure persons!

- Disconnect all supply lines before transport!

Risk of tipping!

There is a risk of the machine tipping over and injuring persons or being damaged itself during movement and set up. Tilt resistance is guaranteed up to an angle of 10° (according to IEC 60974-1).

- Set up and transport the machine on level, solid ground.
- Secure add-on parts using suitable equipment.

Risk of accidents due to incorrectly installed leads!

Incorrectly installed leads (mains, control and welding leads or intermediate hose packages) can present a tripping hazard.

- Lay the supply lines flat on the floor (avoid loops).
- Avoid laying the leads on passage ways.

Risk of injury from heated coolant and its connections!

The coolant used and its connection or connection points can heat up significantly during operation (water-cooled version). When opening the coolant circuit, escaping coolant may cause scalding.

- Open the coolant circuit only when the power source or cooling unit is switched off!
- Wear proper protective equipment (protective gloves)!
- Seal open connections of the hose leads with suitable plugs.

☞ ***The units are designed for operation in an upright position!***

Operation in non-permissible positions can cause equipment damage.

- ***Only transport and operate in an upright position!***

☞ ***Accessory components and the power source itself can be damaged by incorrect connection!***

- ***Only insert and lock accessory components into the relevant connection socket when the machine is switched off.***
- ***Comprehensive descriptions can be found in the operating instructions for the relevant accessory components.***
- ***Accessory components are detected automatically after the power source is switched on.***

☞ ***Protective dust caps protect the connection sockets and therefore the machine against dirt and damage.***

- ***The protective dust cap must be fitted if there is no accessory component being operated on that connection.***
- ***The cap must be replaced if faulty or if lost!***

3 Intended use

⚠ WARNING

§

Hazards due to improper usage!
The machine has been constructed to the state of the art and any regulations and standards applicable for use in industry and trade. It may only be used for the welding procedures indicated at the rating plate. Hazards may arise for persons, animals and material objects if the equipment is not used correctly. No liability is accepted for any damages arising from improper usage!

- The equipment must only be used in line with its designated purpose and by trained or expert personnel!
- Do not improperly modify or convert the equipment!

3.1 Applications

Arc welding machine for microplasma DC welding with HF start (contactless). Suitable for operation with manually guided welding torches.
It may be possible to expand the range of functions by using accessories (see the documentation in the relevant chapter).

3.2 Software version

These instructions apply to the following software version:

07.0400

The query of the software versions only serves to inform the authorised service staff. It is available in the machine configuration menu > *see 5.12 chapter*.

3.3 Documents which also apply

3.3.1 Warranty

For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at www.ewm-group.com!

3.3.2 Declaration of Conformity

CE This product corresponds in its design and construction to the EU directives listed in the declaration. The product comes with a relevant declaration of conformity in the original.

3.3.3 Welding in environments with increased electrical hazards

S **In compliance with IEC / DIN EN 60974, VDE 0544 the machines can be used in environments with an increased electrical hazard.**

3.3.4 Service documents (spare parts and circuit diagrams)

⚠ WARNING

Do not carry out any unauthorised repairs or modifications!
To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!
The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

Original copies of the circuit diagrams are enclosed with the unit.

Spare parts can be obtained from the relevant authorised dealer.

3.3.5 Calibration/Validation

We hereby confirm that this product was tested with calibrated measuring equipment according to the applicable standards IEC/EN 60974, ISO/EN 17662 and complies with the permissible tolerances. Recommended calibration interval: 12 months.

4 Machine description – quick overview

4.1 Front view / side view from left

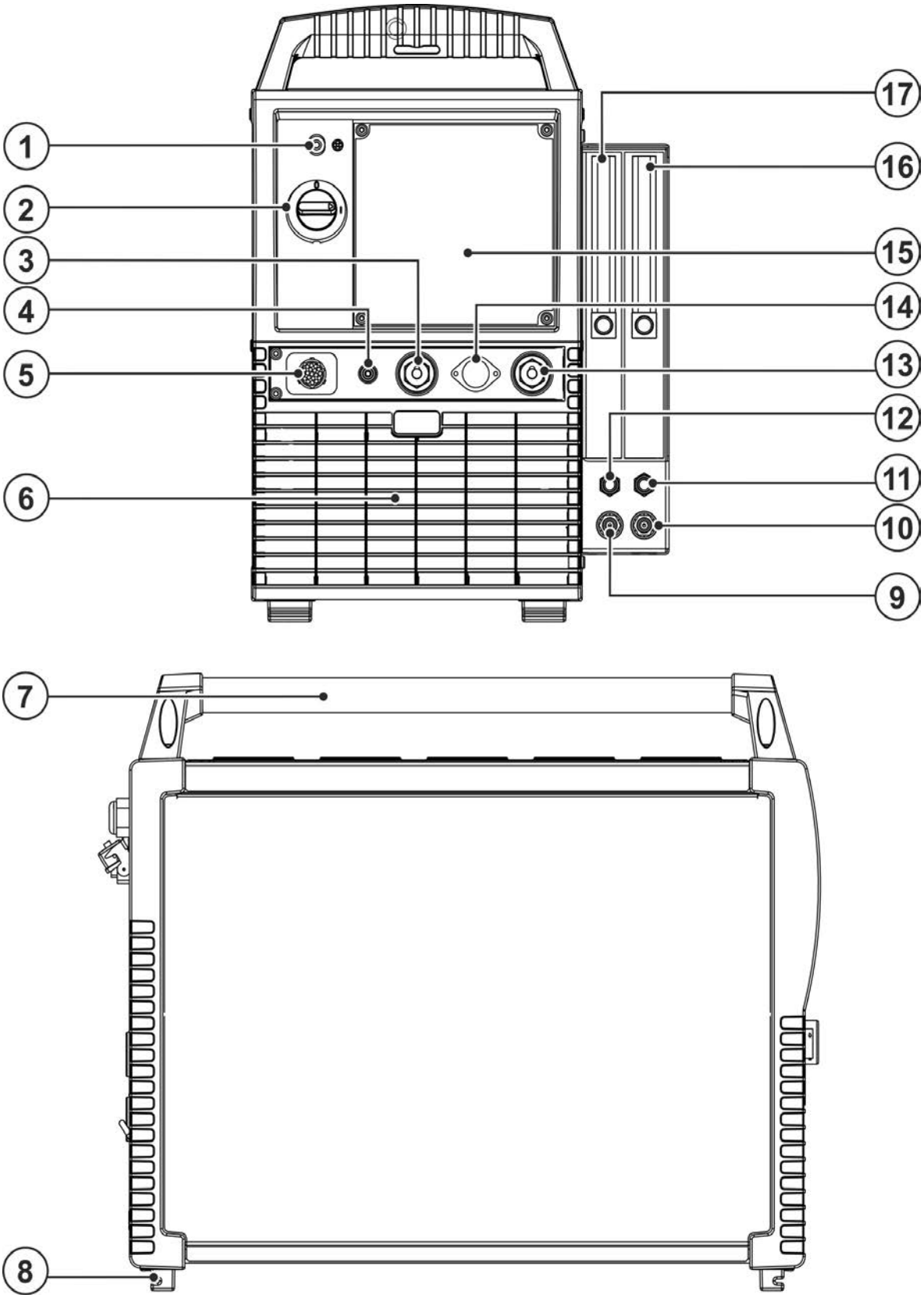


Figure 4-1

Item	Symbol	Description
1		**Ready for operation signal light** Signal light on when the machine is switched on and ready for operation
2		**Main Switch** Switching the machine on or off.
3		**Workpiece lead connection socket**
4		**Pilot current connection socket** Plasma welding torch nozzle potential
5		**19-pole connection socket (analogue)** For connecting analogue accessory components (remote control, welding torch control lead, etc.)
6		**Cooling air inlet** Dirt filter optional *> see 6.1.2 chapter*
7		**Carrying handle**
8		**Machine feet**
9		**Quick connect coupling (red)** coolant return
10		**Quick connect coupling (blue)** coolant supply
11		**Quick connect coupling plasma gas (plug nipple type 20)** Connection to welding torch
12		**Quick connect coupling shielding gas (coupling type 20)** Connection to welding torch
13		**Welding current connection socket, welding torch**
14		**Connection socket (welding torch control cable) > *see 5.1.9.3 chapter***
15		**Machine control > *see 4.3 chapter***
16		**Plasma gas flow regulator** Control and display of gas flow volume
17		**Shielding gas flow regulator** Control and display of gas flow volume

4.2 Rear view / side view from right

The device configuration shown may differ in case of an additional ex works options or retrofitting options > *see 9 chapter*.

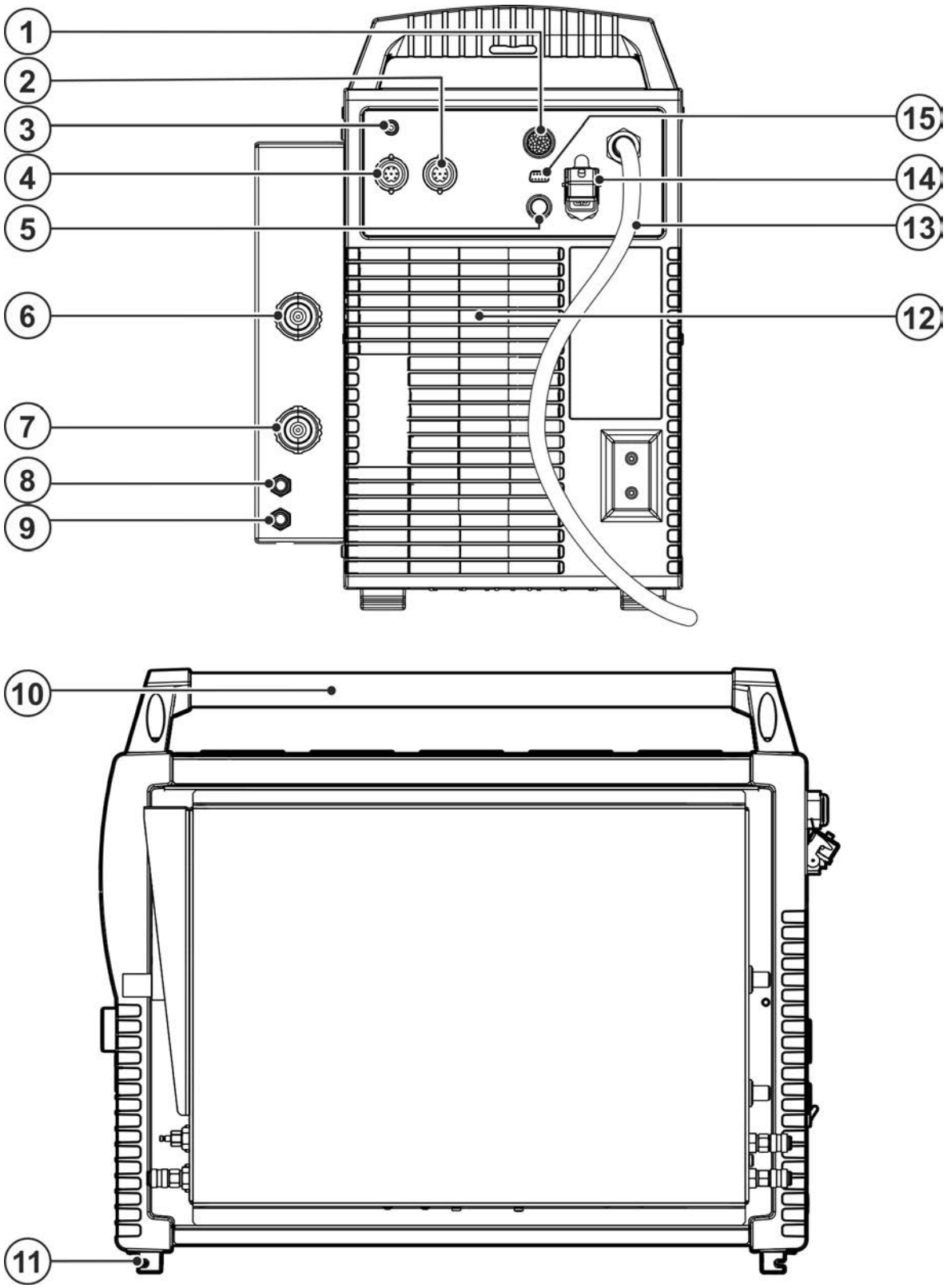


Figure 4-2

Item	Symbol	Description
1		**19-pole mechanised welding interface (analogue)** *> see 5.10.1 chapter*
2		**7-pole connection socket (digital)** For connecting digital accessory components
3		**Key button, Automatic cutout** Wire feed motor supply voltage fuse (press to reset a triggered fuse)
4		**7-pole connection socket** For connecting Wire feed unit
5		**8-pole connection socket** Cooling unit control lead
6		**G1/4" connecting nipple, shielding gas connection** Connection to the pressure reducer
7		**G1/4" connecting nipple, plasma gas connection** Connection to the pressure reducer
8		**Quick connect coupling (red)** coolant return
9		**Quick connect coupling (blue)** coolant supply
10		**Carrying handle**
11		**Machine feet**
12		**Cooling air outlet**
13		**Mains connection cable > *see 5.1.6 chapter***
14		**5-pole connection socket** Cooling unit voltage supply
15		**Connection socket (9-pole) - D-Sub** PC interface > *see 5.11 chapter*

4.3 Machine control – Operating elements

4.3.1 Overview of control sections

For description purposes, the machine control has been divided into two sections (A, B) to ensure maximum clarity. The setting ranges for the parameter values are summarised in the parameter overview section > *see 10.1 chapter*.

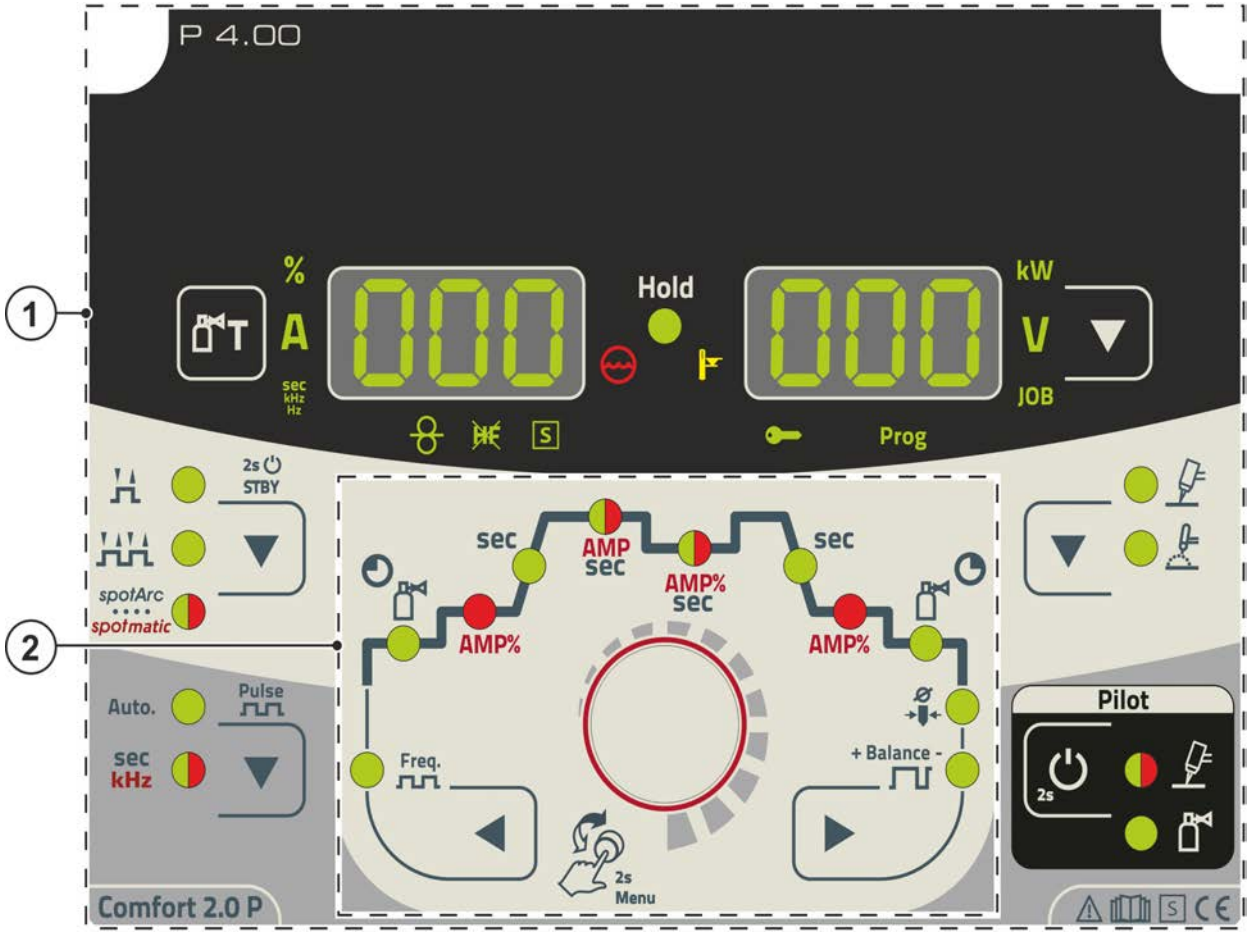


Figure 4-3

Item	Symbol	Description
1		**Control section A** *> see 4.3.1.1 chapter*
2		**Control section B** *> see 4.3.1.2 chapter*

4.3.1.1 Control section A

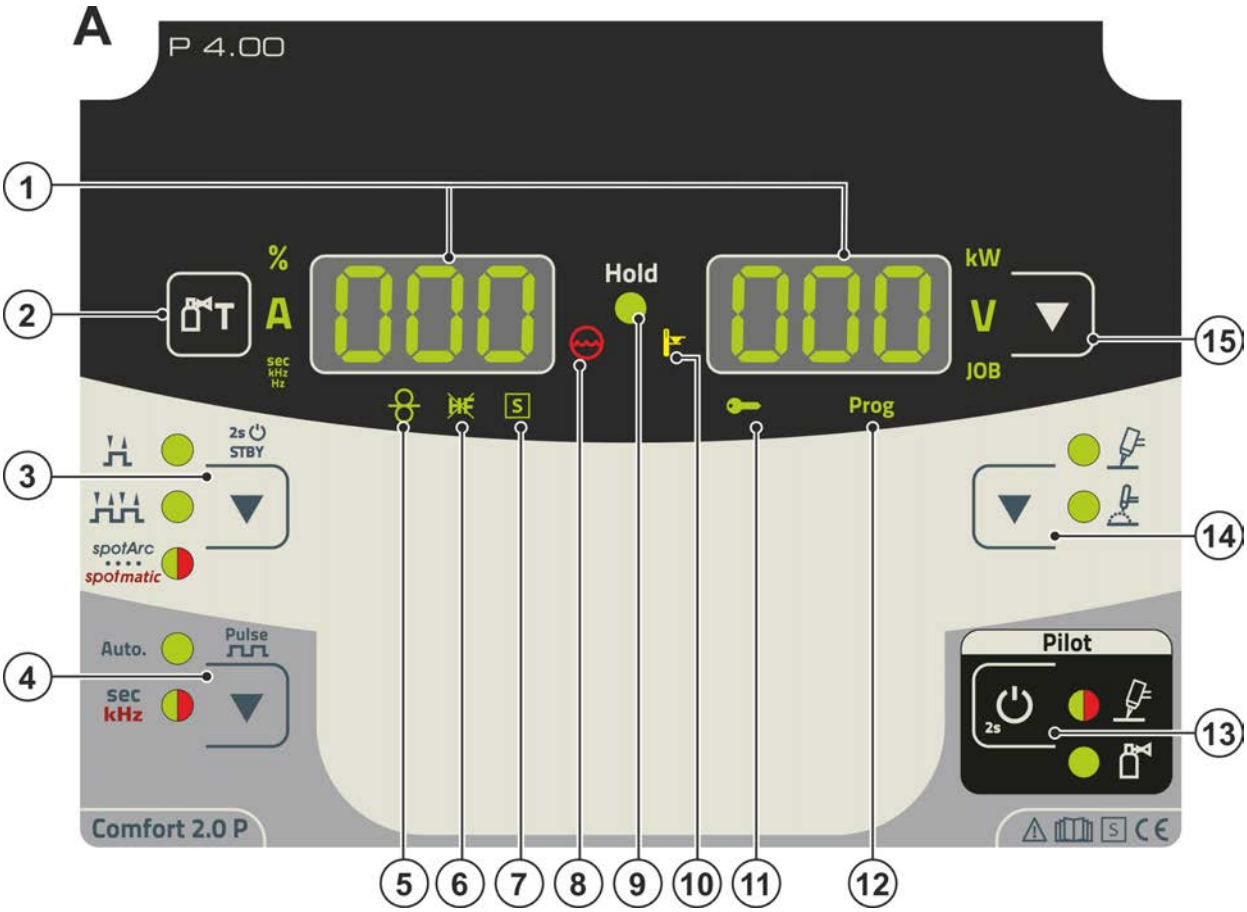


Figure 4-4

Item	Symbol	Description
1	000	**Welding data display (3-digit)** Displays the welding parameters and the corresponding values > *see 4.4.6 chapter*
2		**Gas test push-button > *see 5.1.7.3 chapter***
3		**Operating mode > *see 5.3.6 chapter* / power-saving mode push-button > *see 5.8 chapter*** H----------Latched -------Non-latched spotArc spotmatic -------spotArc spot welding procedure – signal light turns green spotArc spotmatic -------spotmatic spot welding procedure –signal light turns red 2s STBY ---------Press button for long interval to put machine into power-saving mode. Activate one of the operating elements to reactivate.
4		**Pulsed welding push-button** **Auto.**----TIG automated pulsing (frequency and balance) sec kHz---------Signal light turns green: Pulsing (thermal pulsing) sec kHz---------Signal light lights up in red: kHz pulsing (metallurgical pulsing)
5		**Filler wire welding signal light** For machines with filler wire only (AW)
6	HF	**TIG ignition type signal light** Signal light on: Lift arc ignition active/HF start off. You can switch the ignition type in the Expert menu (TIG) > *see 5.3.4 chapter*.
7	S	**Character S function signal light** Indicates that it is possible to weld in an environment with major electric hazards, such as in boilers. Service must be informed if this signal light is not on.

Item	Symbol	Description
8		**Coolant fault signal light** Signals pressure loss or low coolant level in the coolant circuit.
9	Hold	**Signal light Status display** After each completed welding task, the last values used in the welding process for the welding current and welding voltage are shown on the displays, and the signal light will be on
10		**Excess temperature signal light** In case of excess temperature, temperature monitors de-activate the power unit, and the excess temperature control lamp comes on. Once the machine has cooled down, welding can continue without any further measures.
11		**Access control active signal light** Signal light is on when access control is active on the machine control > *see 5.9 chapter*.
12	Prog	**Programme signal light (only for machine series “RC”)** Display of the current program number in the welding data display.
13		**Pilot arc push-button** ------ Ignition process started (signal light turns green) ------ Pilot arc on (signal light on red) ------ Plasma gas flows (signal light turns green)
14		**Welding procedure push-button** --------- Plasma welding --------- TIG welding
15		**Display switching push-button** kW ------- Welding power display V --------- Welding voltage display JOB------ Display and setting of the JOB number with the control button

4.3.1.2 Control section B

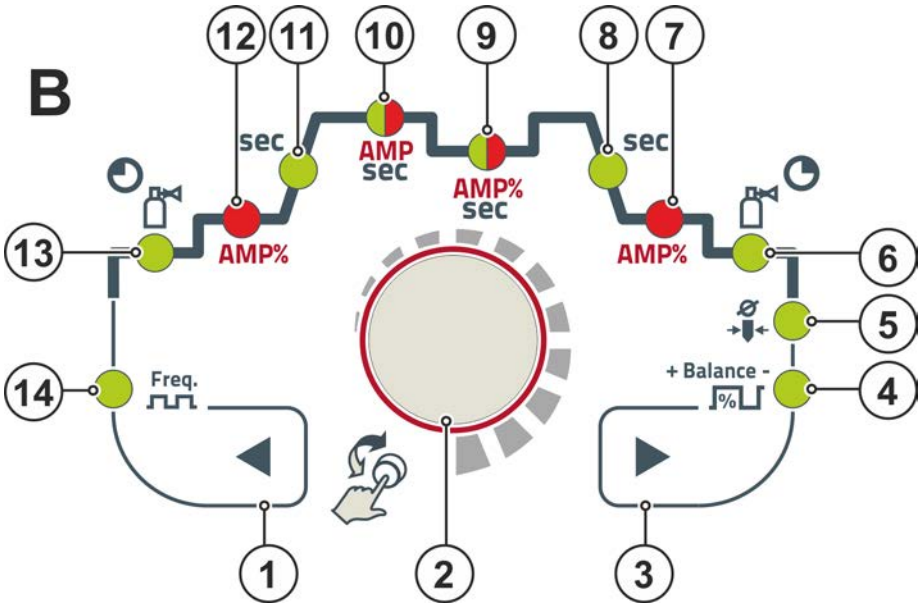


Figure 4-5

Item	Symbol	Description
1		**Parameter selection push-button, left** The welding sequence parameters are selected one after another in an anti-clockwise direction. For control systems without this button settings are done exclusively via the control button.
2		**Control button** Central control button to be pressed or turned > *see 4.4 chapter*.

Item	Symbol	Description
3		**Parameter selection push-button, right** The welding sequence parameters are selected one after another in a clockwise direction. For control systems without this button settings are done exclusively via the control button.
4		**Balance signal light** bAL Pulse balance
5		**Electrode diameter signal light** ndA Ignition optimisation (TIG)/tungsten balling basic setting
6		**Gas post-flow time** GPt
7	**AMP%**	**End current signal light** I Ed
8	**sec**	**Down-slope time** tdn **signal light**
9	**AMP%** **sec**	**Signal light, two colour** Red: Secondary or pulse pause current I 2 (% of AMP) Green: Pulse pause time t 2
10	**AMP** **sec**	**Signal light, two colour** Red: Main current I 1/pulse current I PL Green: Pulse time t 1
11	**sec**	**Signal light Up-slope time** tUP
12	**AMP%**	**Signal light start current** I St
13		**Gas pre-flow time signal light** GPr
14		FrE **signal light**

4.4 Operating the machine control

4.4.1 Main screen

The machine control switches to the main screen after it has been turned on or a setting has been completed. This means that the previously selected settings (indicated by signal lights where applicable) and the nominal value for the current (A) are displayed in the left-hand welding data display. Depending on the selection, the right-hand display shows the welding voltage (V) nominal value or the welding power (kW) actual value. The control always switches back to the main screen after 4 sec..

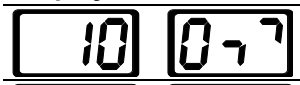
4.4.2 Welding power setting

The welding power is set using the control button. You can also adjust the parameters in the operation sequence or settings in the different machine menus.

4.4.3 Welding parameter setting in the operation sequence

Welding parameters are set by briefly pressing the control knob (selecting the function sequence) and then turning the knob (navigation to the desired parameter). Press again to apply the selected parameter as the setting (corresponding parameter value and signal light flash). Turn the button to set the parameter value.

During welding parameter setting, the parameter value to be set flashes in the left hand display. A parameter abbreviation or a deviation in the specified parameter value upwards or downwards is shown on the right-hand display:

Display	Meaning
	**Increase the parameter value** To return to the factory settings.
	**Factory setting (example value = 20)** Parameter is set to optimum value
	**Decrease the parameter value** To return to the factory settings.

4.4.4 Setting advanced welding parameters (Expert menu)

The Expert menu contains functions and parameters which cannot be set directly in the machine control or which do not need to be et on a regular basis. The number and display of these parameters depends on the previously selected welding procedure or the functions.

To select them hold the control button for more than 2 sec. Select the required parameter/menu item by turning (navigate) and pressing (confirm) the control button.

You can also or alternatively use the push-buttons to the left and right of the control button to navigate.

4.4.5 Changing basic settings (machine configuration menu)

The basic welding system functions can be adjusted in the machine configuration menu. Only experienced users should change the settings > *see 5.12 chapter*.

4.4.6 Welding data display

The following welding parameters can be displayed before (nominal values), during (actual values) or after welding (hold values):

Parameter	Before welding (nominal values)	During welding (actual values)	After welding (hold values)
Welding current	✓	✓	✓
Parameter times	✓	✗	✗
Parameter currents	✓	✗	✗
Frequency, balance	✓	✗	✗
JOB number	✓	✗	✗
Welding power	✗	✓	✓
Welding voltage	✓	✓	✓

When the hold values are displayed after welding and the settings are then changed (e.g. welding current), the display will switch to the relevant nominal values.

The parameters that can be set in the function sequence of the machine control depend on the selected welding task. This means that if for example you have not selected a pulse variant, then you cannot set any pulse times in the function sequence.

4.4.7 Setting the welding current (absolute/percentage)

The welding current for the ignition, secondary, end and hot start current can be set as a percentage of the main current AMP or as an absolute value. To select, use the parameter AbS in the configuration menu > *see 5.12 chapter*.

5 Design and function

⚠ WARNING

Risk of injury from electrical voltage!
Contact with live parts, e.g. power connections, can be fatal!
- Observe the safety information on the first pages of the operating instructions!
- Commissioning must be carried out by persons who are specifically trained in handling power sources!
- Connect connection or power cables while the machine is switched off!

Read and observe the documentation to all system and accessory components!

5.1 Transport and installation

⚠ WARNING

Risk of accident due to improper transport of machines that must not be lifted!
Do not lift or suspend the machine! The machine can drop and cause injuries! The handles, straps or brackets are suitable for transport by hand only!
- The machine must not be suspended or lifted using a crane.

☞ ***A connected and ready-to-use welding torch cooling unit is required for the operation of this plasma welding machine!***

5.1.1 Ambient conditions

☞ ***T he machine must not be operated in the open air and must only be set up and operated on a suitable, stable and level base!***
- ***The operator must ensure that the ground is non-slip and level, and provide sufficient lighting for the place of work.***
- ***Safe operation of the machine must be guaranteed at all times.***

☞ ***Equipment damage due to contamination!***
Unusually high amounts of dust, acids, corrosive gases or substances can damage the machine (observe maintenance intervals > see 6.2 chapter).
- ***Avoid large amounts of smoke, steam, oily fumes, grinding dust and corrosive ambient air!***

5.1.1.1 In operation

Temperature range of the ambient air:
- -25 °C to +40 °C (-13 °F to 104 °F) [1]

Relative humidity:
- up to 50 % at 40 °C (104 °F)
- up to 90 % at 20 °C (68 °F)

5.1.1.2 Transport and storage

Storage in a closed room, temperature range of the ambient air:
- -30 °C to +70 °C (-22 °F to 158 °F) [1]

Relative humidity
- up to 90 % at 20 °C (68 °F)

[1] Ambient temperature dependent on coolant! Observe the coolant temperature range of the torch cooling

5.1.2 Machine cooling

☞ ***Insufficient ventilation results in a reduction in performance and equipment damage.***
- ***Observe the ambient conditions!***
- ***Keep the cooling air inlet and outlet clear!***
- ***Observe the minimum distance of 0.5 m from obstacles!***

5.1.3 Workpiece lead, general

⚠ CAUTION

Risk of burning due to incorrect welding current connection!
If the welding current plugs (machine connections) are not locked or if the workpiece connection is contaminated (paint, corrosion), these connections and leads can heat up and cause burns when touched!

- Check welding current connections on a daily basis and lock by turning to the right when necessary.
- Clean workpiece connection thoroughly and secure properly. Do not use structural parts of the workpiece as welding current return lead!

5.1.4 Notes on the installation of welding current leads

- Incorrectly installed welding current leads can cause faults in the arc (flickering).
- Lay the workpiece lead and hose package of power sources without HF igniter (MIG/MAG) for as long and as close as possible in parallel.
- Lay the workpiece lead and hose package of power sources with HF igniter (TIG) for as long as possible in parallel with a distance of 20 cm to avoid HF sparkover.
- Always keep a distance of at least 20 cm to leads of other power sources to avoid interferences
- Always keep leads as short as possible! For optimum welding results max. 30 m (welding lead + intermediate hose package + torch lead).

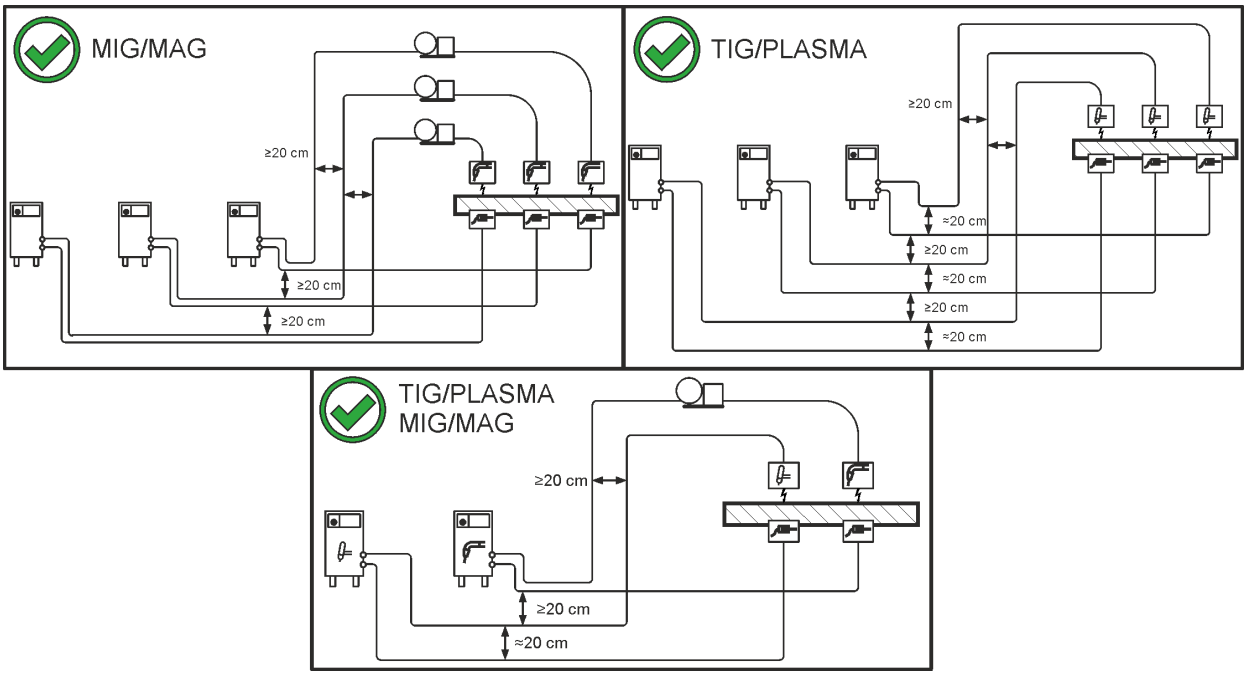


Figure 5-1

- Use an individual welding lead to the workpiece for each welding machine!

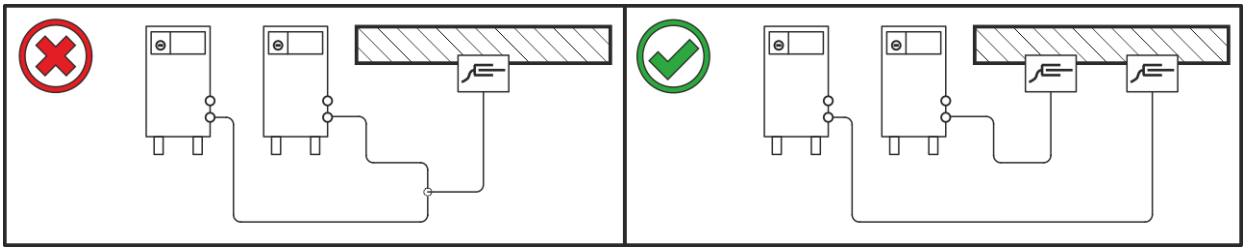


Figure 5-2

- Fully unroll welding current leads, torch hose packages and intermediate hose packages. Avoid loops!
- Always keep leads as short as possible!

Lay any excess cable lengths in meanders.

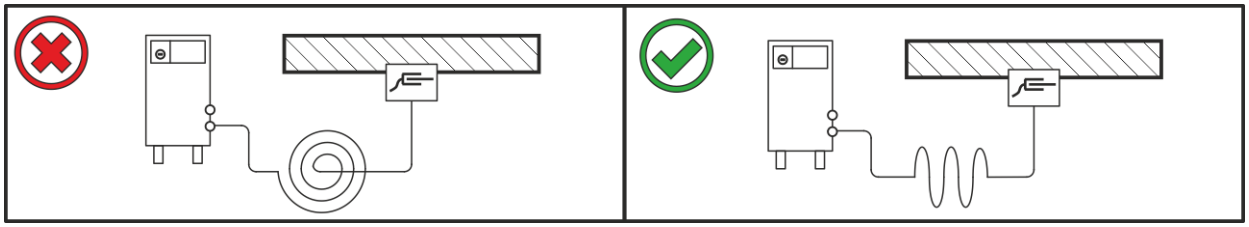


Figure 5-3

5.1.5 Stray welding currents

⚠ WARNING

Risk of injury due to stray welding currents!
Stray welding currents can destroy protective earth conductors, damage machines and electronic devices and cause overheating of components, leading to fire.

- Check that all welding current connections are firmly secured and electrical connections are in perfect condition.
- Set up, attach or suspend all conductive power source components such as casing, transport vehicles and crane frames so they are insulated.
- Do not place any other electronic devices such as drills or angle grinders on the power source, transport vehicle or crane frames unless they are insulated.
- Always put welding torches and electrode holders on an insulated surface when they are not in use.

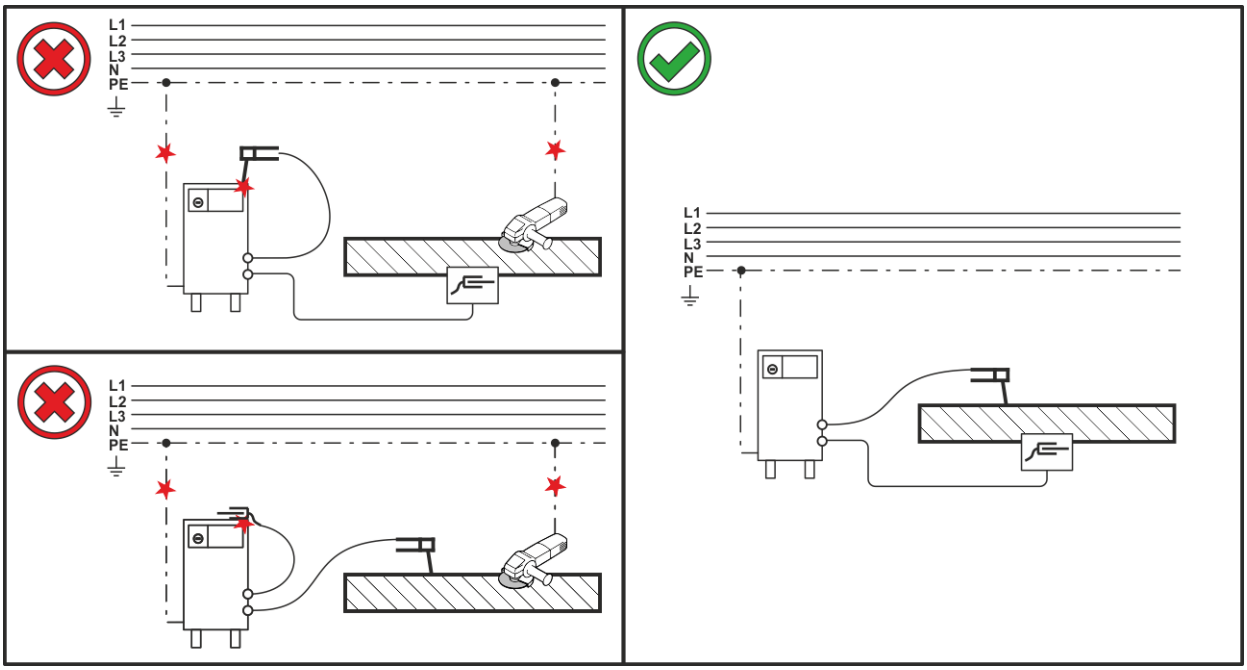


Figure 5-4

5.1.6 Mains connection

⚠ DANGER

Hazards caused by improper mains connection!
An improper mains connection can cause injuries or damage property!

- The connection (mains plug or cable), the repair or voltage adjustment of the device must be carried out by a qualified electrician in accordance with the respective local laws or national regulations!
- The mains voltage indicated on the rating plate must match the supply voltage.
- Only operate machine using a socket that has correctly fitted protective earth.
- Mains plug, socket and lead must be checked by a qualified electrician on a regular basis!
- When operating the generator, always ensure it is earthed as stipulated in the operating instructions. The network created must be suitable for operating machines according to protection class I.

5.1.6.1 Mains configuration

☞ ***The machine may only be connected to a one-phase system with two conductors and an earthed neutral conductor.***

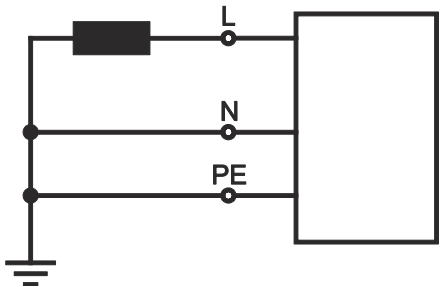


Figure 5-5

Legend

Item	Designation	Colour code
L	Outer conductor	brown
N	Neutral conductor	blue
PE	Protective conductor	green-yellow

- Insert mains plug of the switched-off machine into the appropriate socket.

5.1.7 Shielding and plasma gas supply

⚠ WARNING

Risk of injury due to improper handling of shielding gas cylinders!
Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!

- Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
- Do not attach any element to the shielding gas cylinder valve!
- Prevent the shielding gas cylinder from heating up.

☞ ***An unhindered shielding gas supply from the shielding gas cylinder to the welding torch is a fundamental requirement for optimum welding results. In addition, a blocked shielding gas supply may result in the welding torch being destroyed.***

- ***Always re-fit the yellow protective cap when not using the shielding gas connection.***
- ***All shielding gas connections must be gas tight.***

5.1.7.1 Pressure regulator connection

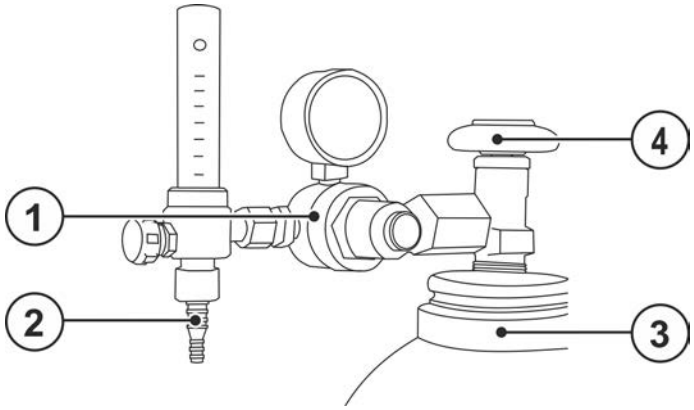


Figure 5-6

Item	Symbol	Description
1		**Pressure regulator**
2		**Output side of the pressure regulator**
3		**Shielding gas cylinder**
4		**Cylinder valve**

- Before connecting the pressure regulator to the gas cylinder, open the cylinder valve briefly to blow out any dirt.
- Tighten the pressure regulator screw connection on the gas bottle valve to be gas-tight.
- Screw the gas hose connection to the outlet side of the pressure regulator gas-tight.

5.1.7.2 Shielding gas hose connection

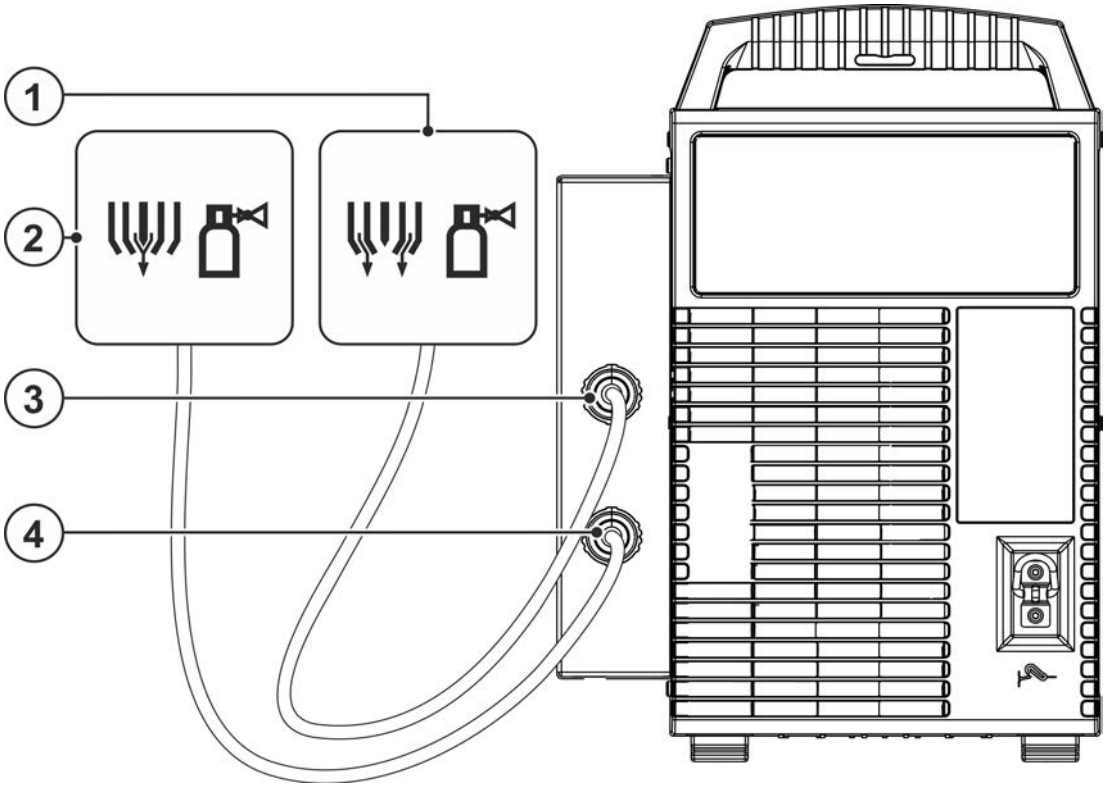


Figure 5-7

Item	Symbol	Description
1		**Shielding gas**

Item	Symbol	Description
2		**Plasma gas**
3		**G1/4" connecting nipple, shielding gas connection** Connection to the pressure reducer
4		**G1/4" connecting nipple, plasma gas connection** Connection to the pressure reducer

- Check correct condition and sealing of tubes. Blow through gas hoses.
- Screw the connection coupling of the plasma gas line onto the G1/4" connecting nipple, plasma gas connection.
- Screw the connection coupling of the shielding gas line onto the G1/4" connecting nipple, shielding gas connection.

5.1.7.3 Gas test

☞ ***The connected gas lines should each have a pre-pressure of 4.5 bar (tolerance limits: plasma gas 4 bar to 5 bar, shielding gas 4 bar to 5 bar).***

The functional sequence for the gas test is carried out in the same way for shielding gas and plasma gas. The gas test is only possible if:

- ***the pilot arc is not ignited and***
- ***no welding process is being carried out.***

Shielding and plasma gas setting can be checked without welding current flowing (currentless) and set if required. Activation of the gas test button releases both gas valves simultaneously and the gas setting can be made at the corresponding flow regulator.

- Press and hold the shielding or plasma gas test pushbutton.
- Release the pushbutton (test procedure complete).
- Press the torch trigger and set the shielding gas quantity with the flow gauge of the pressure regulator.

The flow quantity cannot be set higher on the gas flow regulator for fine adjustment of the gas flow than specified on the shielding gas cylinder pressure reducer.

5.1.7.4 Automatic gas post-flow

If the function is active, the gas post-flow time is defined by the machine control unit in dependence on power output. The defined gas post-flow time can also be adjusted if required. This value is then saved for the current welding task. The automatic gas post-flow function can be activated or deactivated in the machine configuration menu > *see 5.12 chapter*.

5.1.8 Welding torch cooling system

5.1.8.1 Cooling unit connection

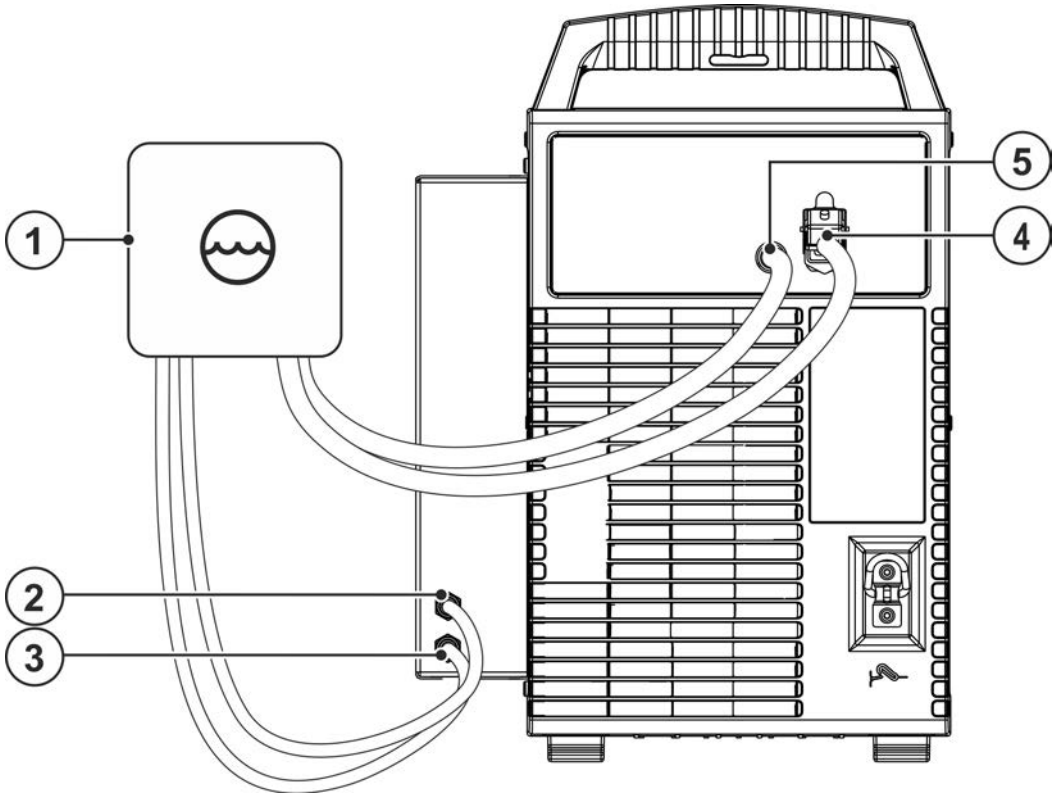


Figure 5-8

Item	Symbol	Description
1		**Welding torch cooling unit**
2		**Quick connect coupling (red)** coolant return
3		**Quick connect coupling (blue)** coolant supply
4		**5-pole connection socket** Cooling unit voltage supply
5		**8-pole connection socket** Cooling unit control lead

- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
  Return line red to quick connect coupling, red (coolant return) and
  supply line blue to quick connect coupling, blue (coolant supply).
- Insert and lock the 5-pole supply plug on the cooling unit into the 5-pole connection socket on the welding machine.
- Insert and lock the 8-pole control lead plug on the cooling unit into the 8-pole connection socket on the welding machine.

5.1.8.2 Connection of external recooling unit

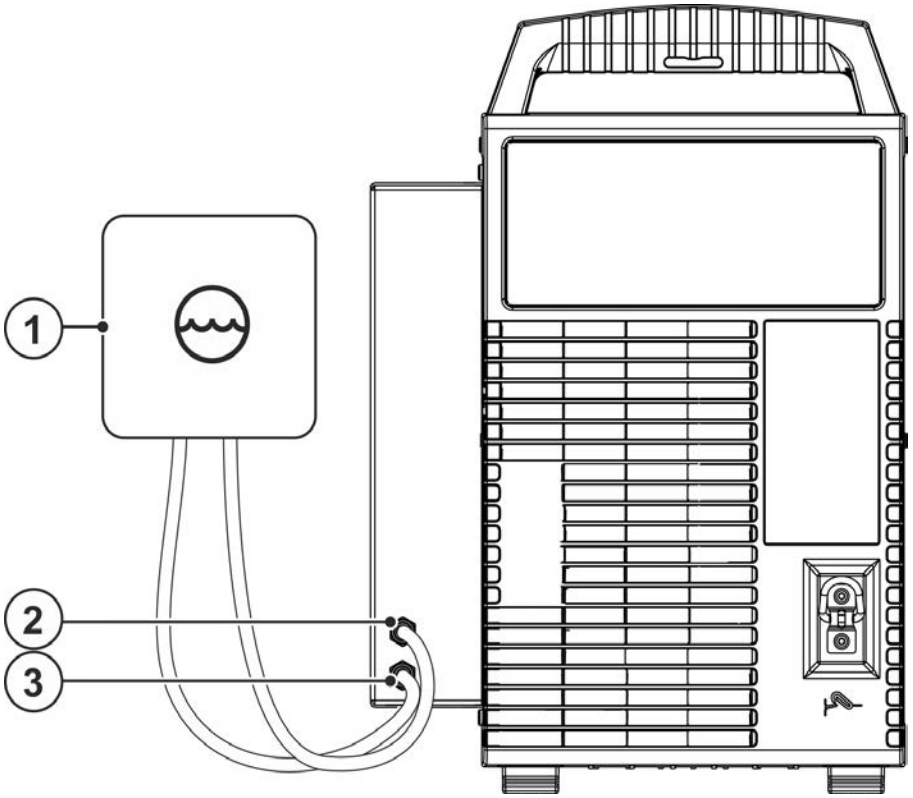


Figure 5-9

Item	Symbol	Description
1		**Welding torch cooling unit**
2		**Quick connect coupling (red)** coolant return
3		**Quick connect coupling (blue)** coolant supply

- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
  Return line red to quick connect coupling, red (coolant return) and
  supply line blue to quick connect coupling, blue (coolant supply).

5.1.9 Welding torch and workpiece line connection

5.1.9.1 Plasma welding

☞ ***Before commissioning, the plasma welding torch must be equipped for the welding JOB and correspondingly set/adjusted!***

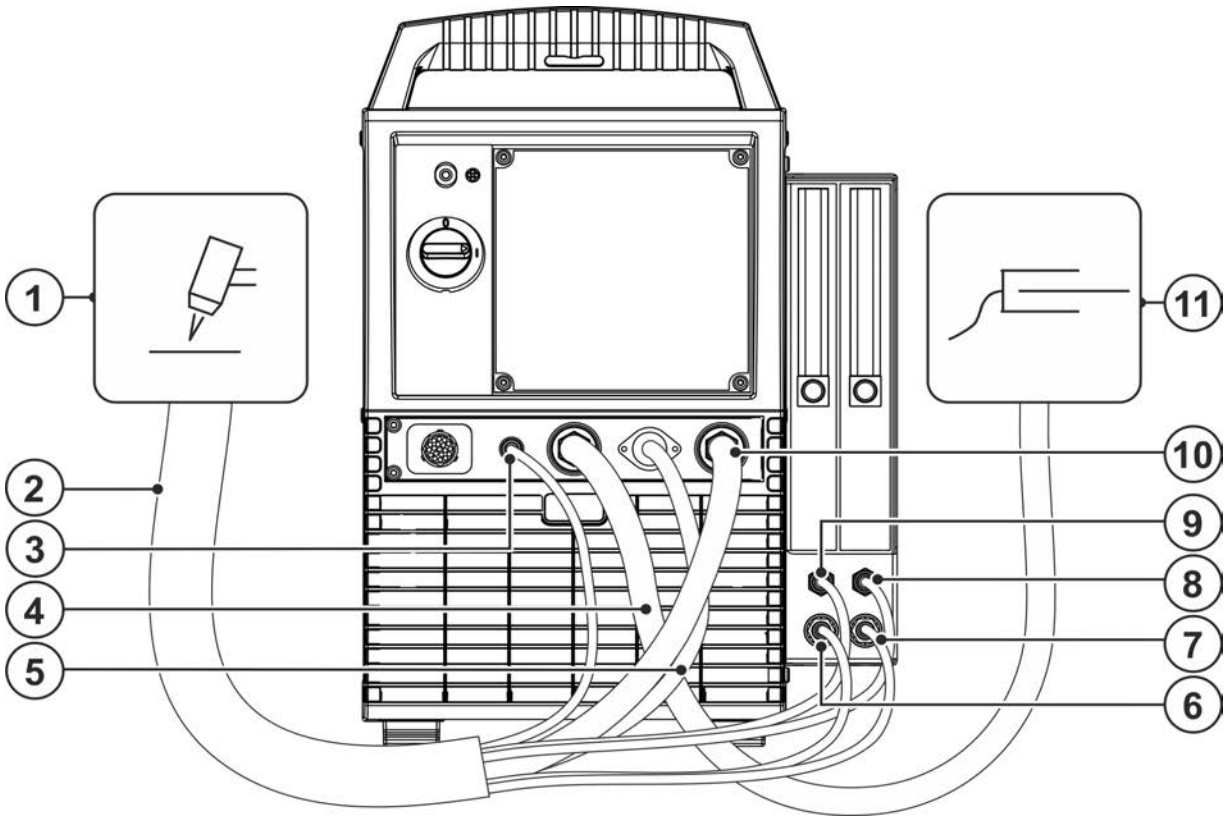


Figure 5-10

Item	Symbol	Description
1		**Welding torch**
2		**Torch hose package**
3		**Pilot current connection socket** Plasma welding torch nozzle potential
4		**Workpiece lead**
5		**Connection socket (welding torch control cable) > *see 5.1.9.3 chapter***
6		**Quick connect coupling (red)** coolant return
7		**Quick connect coupling (blue)** coolant supply
8		**Quick connect coupling plasma gas (plug nipple type 20)** Connection to welding torch
9		**Quick connect coupling shielding gas (coupling type 20)** Connection to welding torch
10		**Welding current connection socket, welding torch**
11		**Workpiece**

- Insert the plug on the welding current lead into the "-" welding current connection socket and lock.
- Insert the plug of the pilot power line into the "+" pilot current connection socket.
- Insert the torch control lead plug into the “5-pole connection socket, welding torch control lead” and lock.
- Insert the quick connect coupling of the plasma gas line onto the quick-release nipple type 20.
- Insert the quick-release nipple of the protective gas line onto the quick connect coupling type 20.
- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
  Return line red to quick connect coupling, red (coolant return) and
  supply line blue to quick connect coupling, blue (coolant supply).
- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.

5.1.9.2 TIG welding

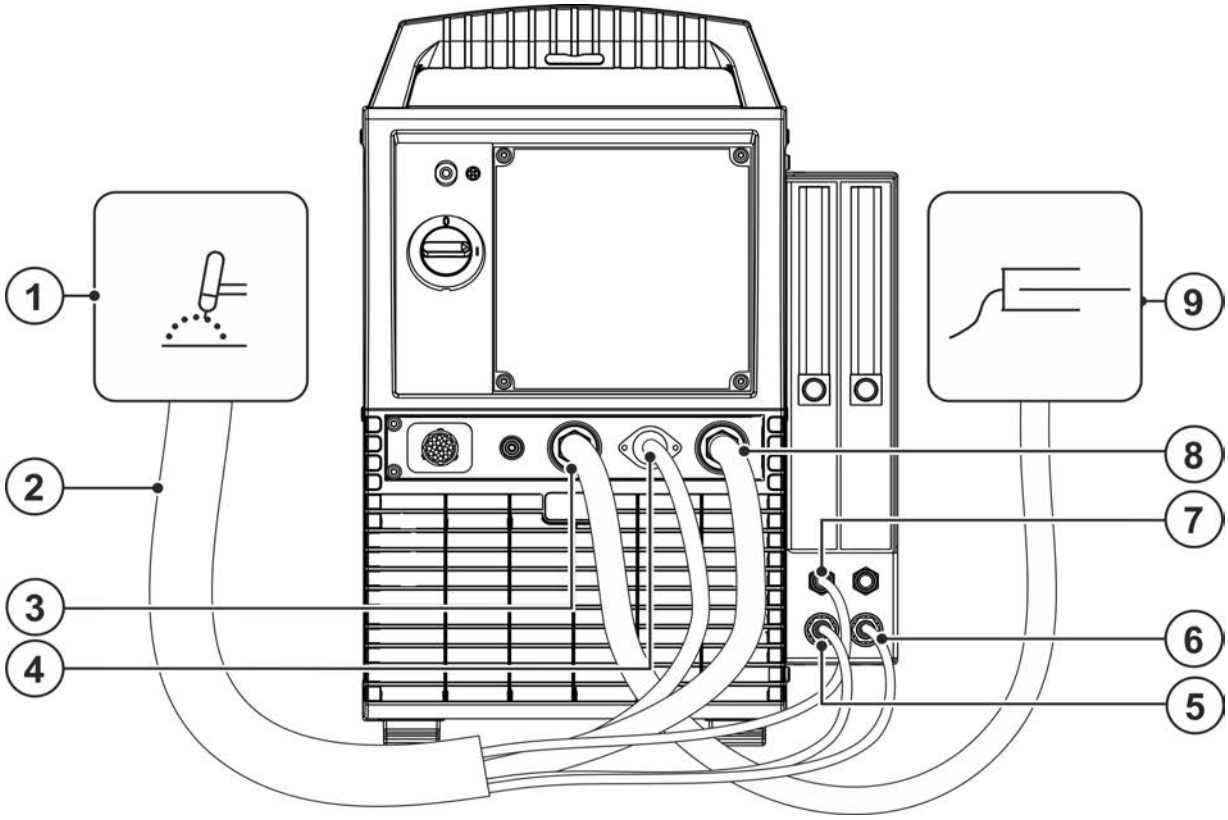


Figure 5-11

Item	Symbol	Description
1		**Welding torch**
2		**Torch hose package**
3		**Workpiece lead**
4		**Connection socket (welding torch control cable) > *see 5.1.9.3 chapter***
5	Red	**Quick connect coupling (red)** coolant return
6	Blue	**Quick connect coupling (blue)** coolant supply
7		**Quick connect coupling shielding gas (coupling type 20)** Connection to welding torch
8		**Welding current connection socket, welding torch**
9		**Workpiece**

- Insert the plug on the welding current lead into the "-" welding current connection socket and lock.
- Insert the torch control lead plug into the “5-pole connection socket, welding torch control lead” and lock.
- Insert the quick-release nipple of the protective gas line onto the quick connect coupling type 20.
- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
  Return line red to quick connect coupling, red (coolant return) and
  supply line blue to quick connect coupling, blue (coolant supply).
- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.

5.1.9.3 Control lead connection

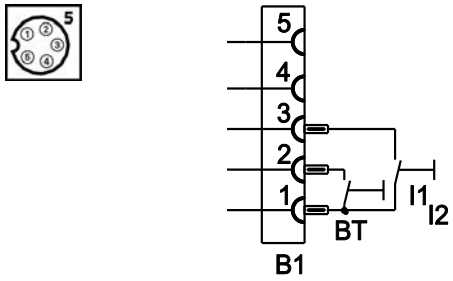


Figure 5-12

5.2 Plasma welding

5.2.1 Welding task selection

☞ ***The basic prerequisite for starting the plasma process is a connected and functioning cooling circuit for cooling of the welding torch.***

5.2.2 Setting welding procedure

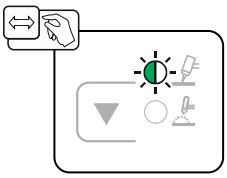


Figure 5-13

5.2.3 Pilot arc

Ignite pilot arc

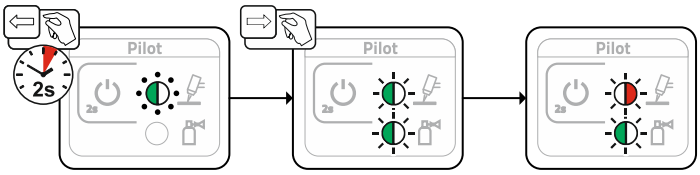


Figure 5-14

Switching off the pilot arc

☞ ***The pilot arc must be switched off and the gas post flow time (plasma gas) waited for before switching off the welding machine. If the welding machine is switched off prematurely the tungsten electrode loses its jacket of shielding gas and will consequently oxidise.***

- ***Switch off the pilot arc before switching off the welding machine!***
- ***Wait until the welding torch has cooled down.***

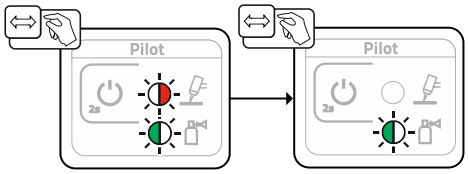


Figure 5-15

5.2.3.1 Adjust pilot arc currents

The pilot arc current can be adapted to the welding process at four operating points:

1. Pilot arc standby current I hS (during the welding pause)
2. Pilot arc ignition current I ni (before welding)
3. Pilot arc process current I hP (during welding)
4. Pilot arc end current I hE (at the welding end during gas post-flow time GPr)

The current is set in the expert menu > *see 5.2.4 chapter*.

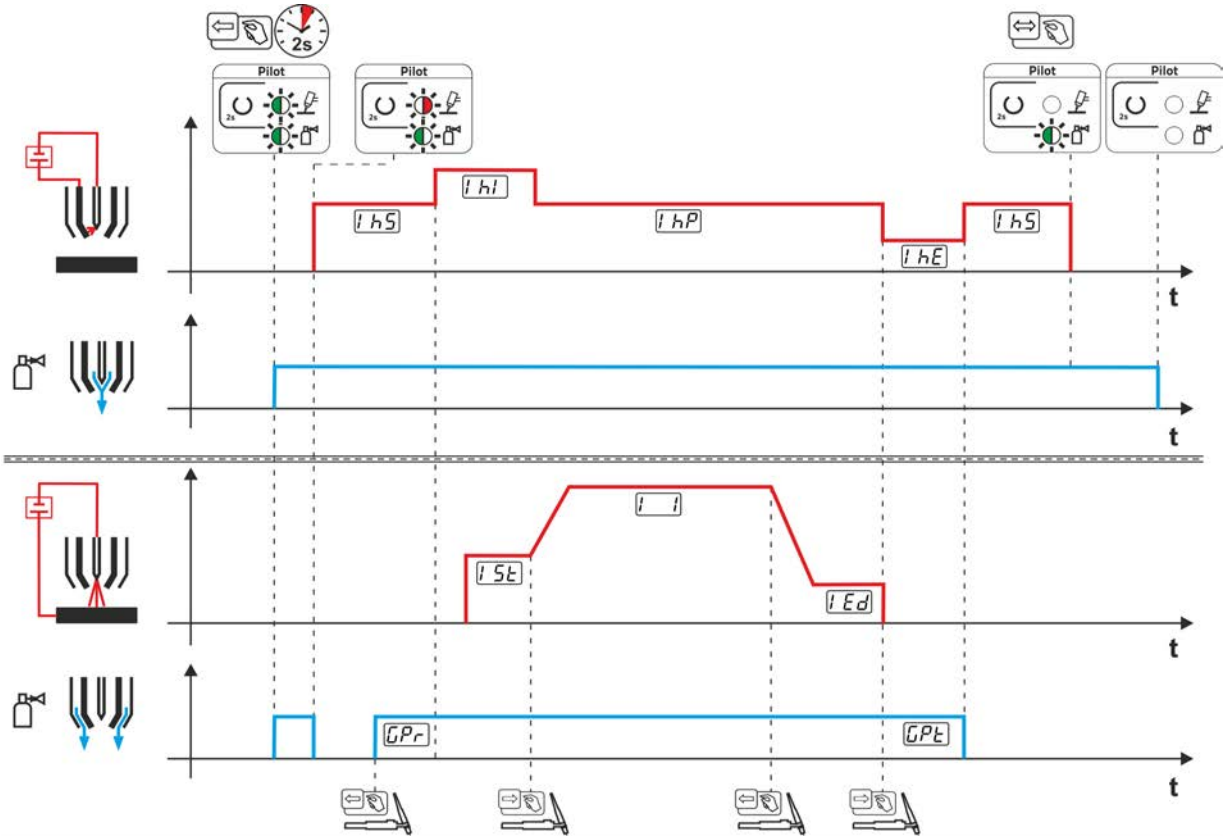


Figure 5-16

5.2.4 Expert Menu (Plasma)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

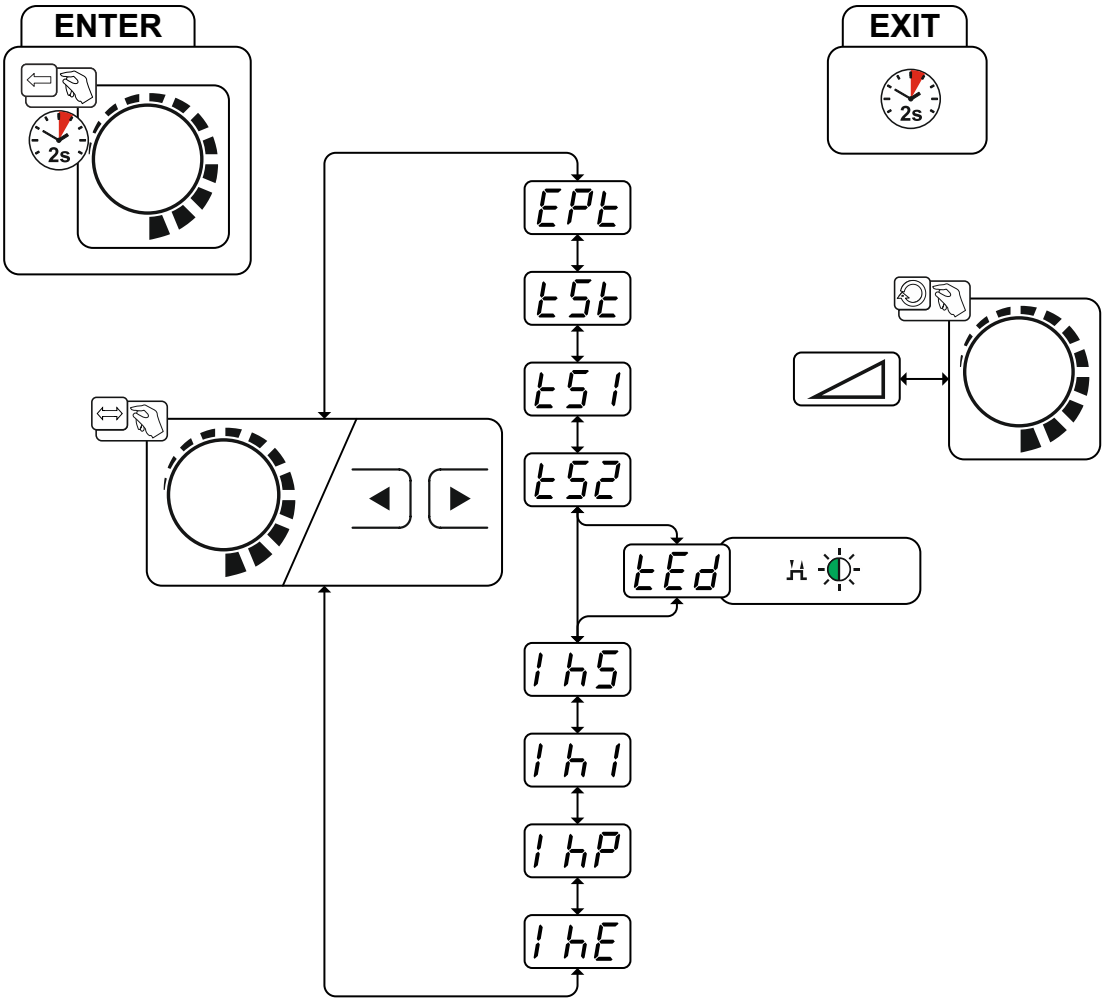


Figure 5-17

Display	Setting/selection
EPt	**Expert menu**
tSt	**Slope time (main current to secondary current)**
tS1	**Slope time (main current to secondary current)**
tS2	**Slope time (secondary current to main current)**
tEd	**Slope time (main current to secondary current)**
I hS	**Pilot arc standby current** No welding process active
I hI	**Pilot arc ignition current** Start phase welding process (gas pre-flow time, start current)
I hP	**Pilot arc process current** Main current phase welding process
I hE	**Pilot arc end current** End current phase welding process (end current, gas post-flow time)

5.3 TIG welding

5.3.1 Welding task selection

The setting of the tungsten electrode diameter has a direct influence on the machine functionality, TIG ignition behaviour and minimum current limits. The ignition energy is controlled by the set electrode diameter. Smaller electrode diameters requires less ignition current and less ignition current time than greater electrode diameters. The set value should correspond to the tungsten electrode diameter. The value can also be set to meet individual requirements, e.g. for thin panels a smaller diameter is recommended to reduce the ignition energy.

The electrode diameter setting determines the minimum current limit, which in turn affects the ignition, main and secondary current. The minimum current limits have a positive effect on the ignition behaviour and ensure a very high arc stability for each electrode diameter selected. The minimum current limit function is enabled ex works, but can be disabled with parameter cLI in the machine configuration menu > *see 5.12 chapter*.

For foot-operated remote control mode, minimum current limits are disabled by default.

The following welding task is an example of use:

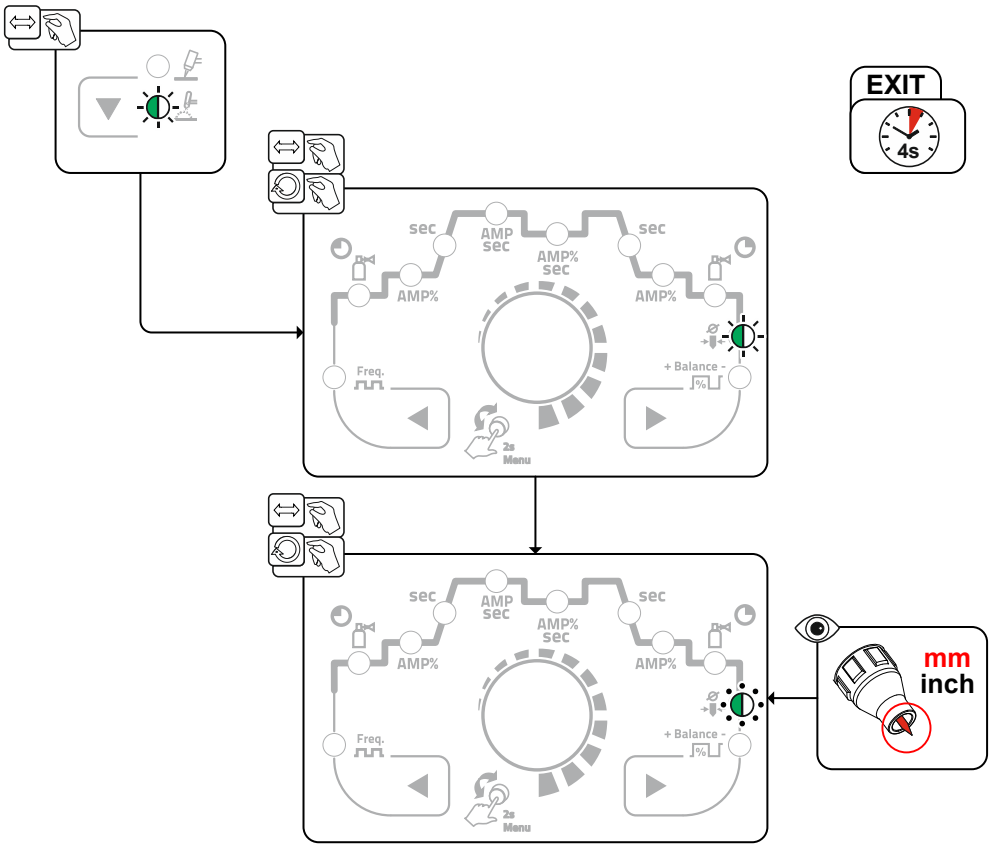


Figure 5-18

5.3.2 Arc ignition

5.3.2.1 HF ignition

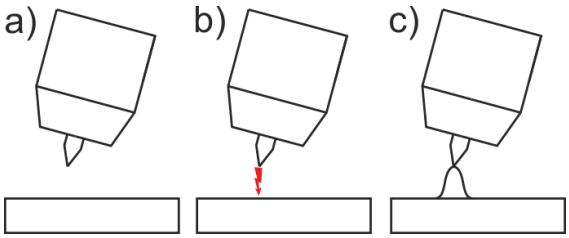


Figure 5-19

The arc is started without contact from high-voltage ignition pulses.

a) Position the welding torch in welding position over the workpiece (distance between the electrode tip and workpiece should be approx. 2-3mm).

b) Press the torch trigger (high voltage ignition pulses ignite the arc).

c) Ignition current flows, and the welding process is continued depending on the operating mode selected.

End the welding process: Release or press the torch trigger depending on the operating mode selected.

5.3.2.2 Liftarc

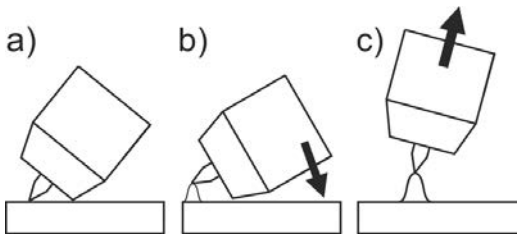


Figure 5-20

The arc is ignited on contact with the workpiece:

a) Carefully place the torch gas nozzle and tungsten electrode tip onto the workpiece and press the torch trigger (liftarc current flowing, regardless of the main current set).

b) Incline the torch over the torch gas nozzle to produce a gap of approx. 2-3 mm between the electrode tip and the workpiece. The arc ignites and the welding current is increased, depending on the operating mode set, to the ignition or main current set.

c) Lift off the torch and swivel to the normal position.

Ending the welding process: Release or press the torch trigger depending on the operating mode selected.

5.3.2.3 Automatic cut-out

Once the fault periods have elapsed, the automatic cut-out stops the welding process when it has been triggered by one of two states:

- During ignition
  3 s after the start of the welding process, no welding current flows (ignition error).
- During welding
  The arc is interrupted for more than 3 s (arc interruption). You can disable or set the time for re-ignition after an arc interruption in the machine configuration menu > *see 5.12 chapter* (parameter tIA).

5.3.3 TIG antistick

The function prevents uncontrolled re-ignition following the sticking of the tungsten electrode in the weld pool by switching off the welding current. In addition, wear at the tungsten electrode is reduced.

After triggering the function the machine immediately switches to the gas post-flow process phase. The welder starts the new process again at the first cycle. The user can switch the function on or off (parameter tAS) > *see 5.12 chapter*.

5.3.4 Expert menu (TIG)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

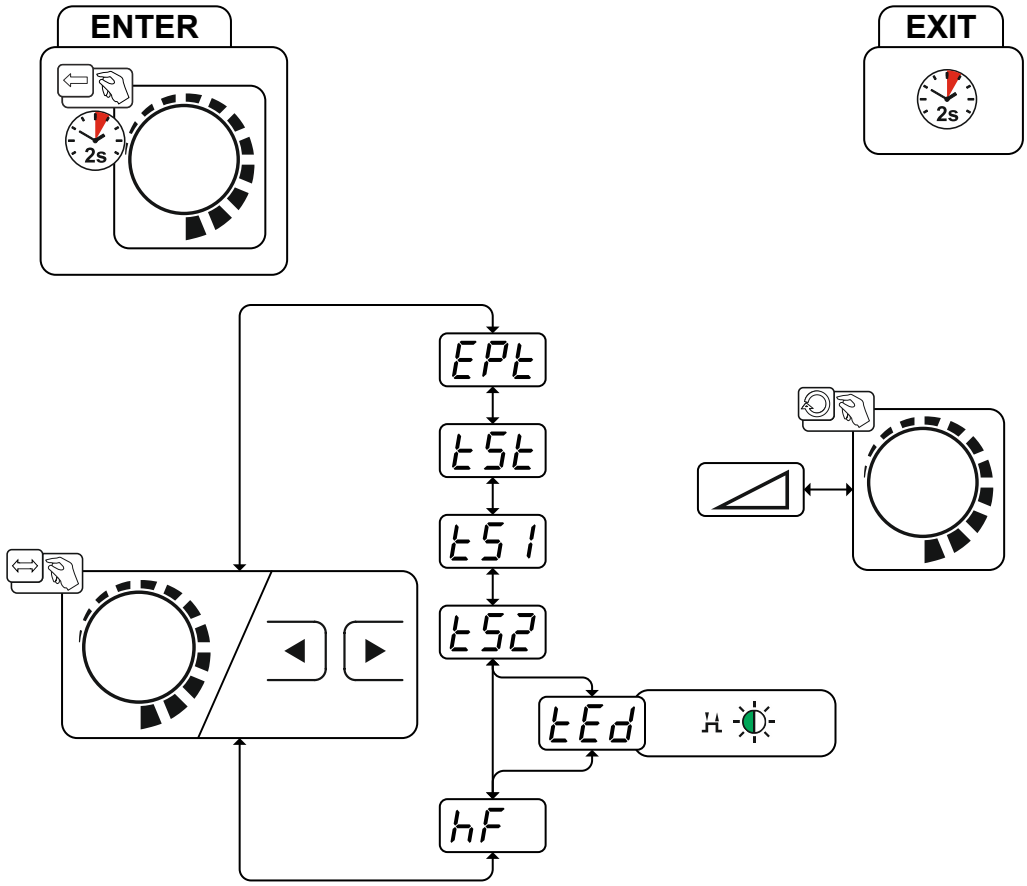


Figure 5-21

Display	Setting/selection
EPt	**Expert menu**
tSt	**Slope time (main current to secondary current)**
tS1	**Slope time (main current to secondary current)**
tS2	**Slope time (secondary current to main current)**
tEd	**Slope time (main current to secondary current)**
hF	**Ignition type (TIG)** on ------ HF start active (ex works) oFF ------ Lift arc ignition active

5.3.5 Aligning the cable resistance

To ensure optimum welding properties, the electric cable resistance should be aligned again whenever an accessory component such as the welding torch or the intermediate hose package (AW) has been changed. The resistance value of the cables can be set directly or can be aligned by the power source. In the delivery state the cable resistance is set to the optimum values. To optimise the welding properties for other cable lengths, an alignment process (voltage correction) is necessary.

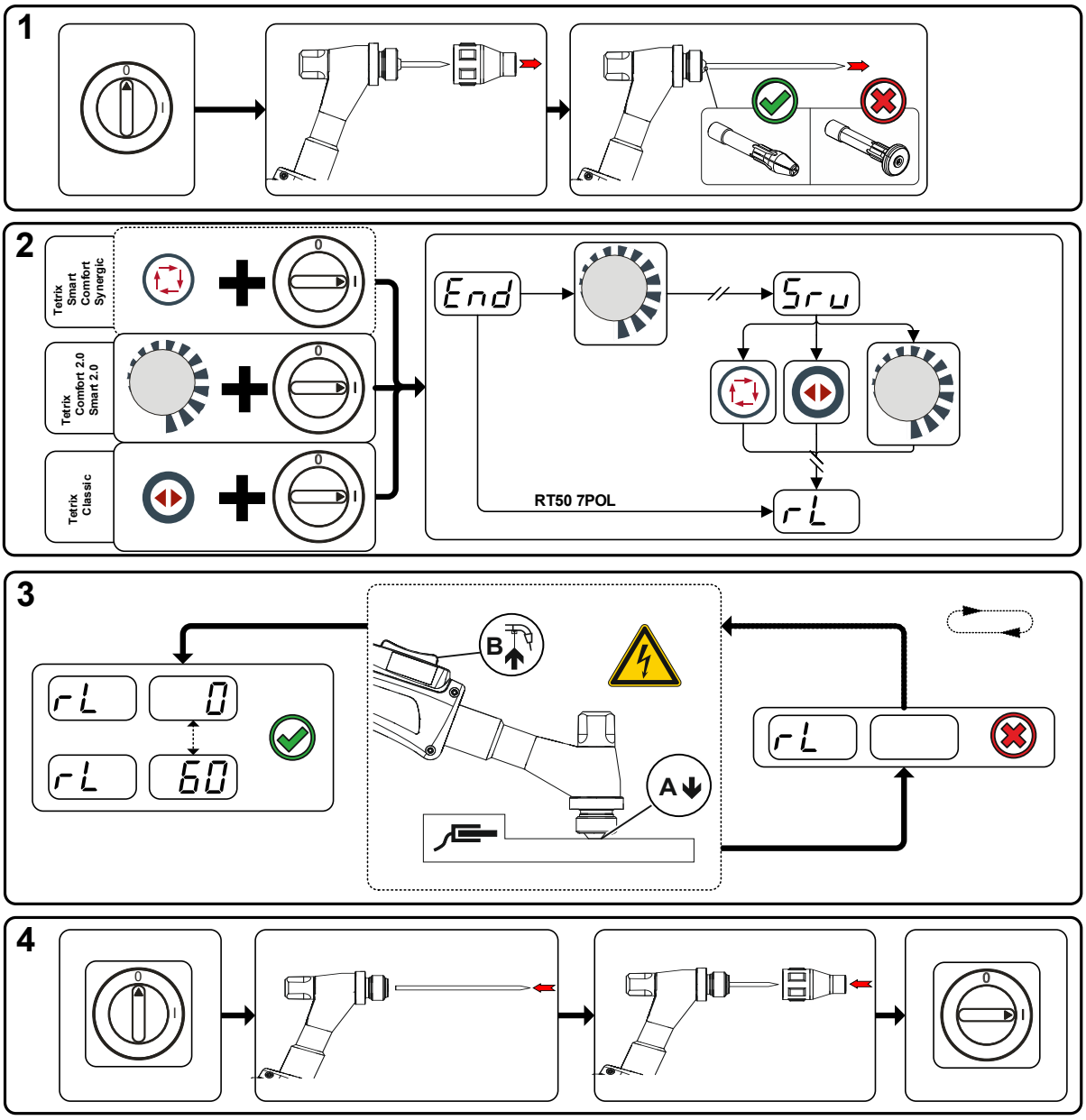


Figure 5-22

1 Preparation

- Switch off the welding machine.
- Unscrew the gas nozzle from the welding torch.
- Unfasten the tungsten electrode and extract.

2 Configuration

- Activate the rotary knob while switching on the welding machine at the same time.
- Release rotary knob.
- You can now use the rotary knob (rotate and press) to select the parameter rL > *see 5.12 chapter*.

3 Alignment/measurement

- Applying slight pressure, press the welding torch with the collet against a clean, purged location on the workpiece and then press the torch trigger for approx. 2 seconds. A short-circuit current will flow briefly, which is used to determine and display the cable resistance. The value can be between 0 mΩ and 60 mΩ. The new value is immediately saved without requiring further confirmation. If no value is shown on the right-hand display, then measurement failed. The measurement must be repeated.

4 Restoring welding standby mode

- Switch off the welding machine.
- Lock the tungsten electrode in the collet again.
- Screw the gas nozzle onto the welding torch.
- Switch on the welding machine.

5.3.6 Operating modes (functional sequences)

5.3.6.1 Explanation of symbols

Symbol	Meaning
	Press torch trigger 1
	Release torch trigger 1
I	Current
t	Time
 GPr	Gas pre-flow
I St	Ignition current
t St	Start time
t UP	Up-slope time
t P	Spot time
I 1 **AMP**	Main current (minimum to maximum current)
I 2 **AMP%**	Secondary current
t 1	Pulse time
t 2	Pulse pause time
I PL	Pulse current
t S1	Pulsed TIG welding: Slope time from main current (AMP) to secondary current (AMP%)
t S2	Pulsed TIG welding: Slope time from secondary current (AMP%) to main current (AMP)
t dn	Down-slope time
I Ed	End-crater current
t Ed	End-crater time

Symbol	Meaning
GPt	Gas post-flow
bAL	Balance
FrE	Frequency

5.3.6.2 Non-latched mode

Selection

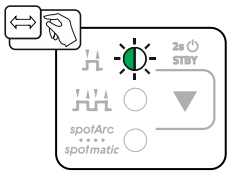


Figure 5-23

Sequence

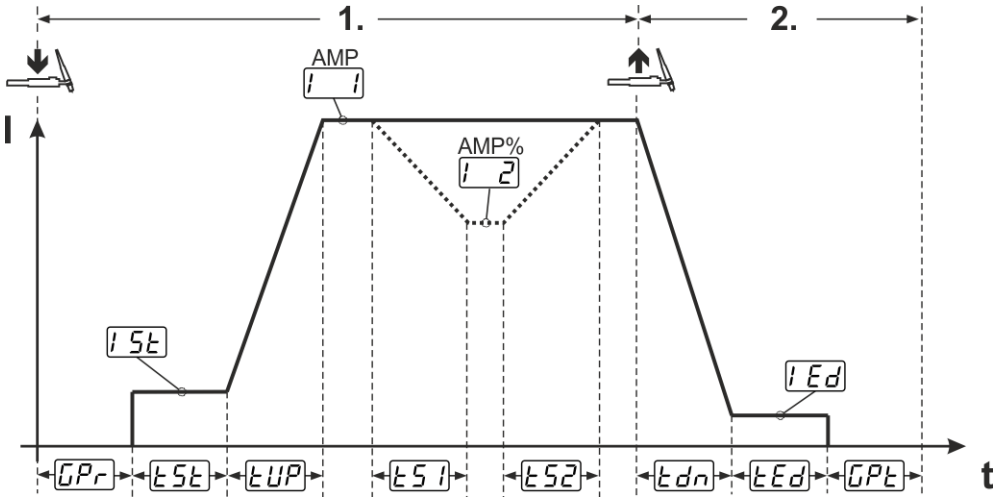


Figure 5-24

1st cycle:

- Press torch trigger 1 and hold down.
- Gas pre-flow time GPr elapses.
- HF ignition pulses jump from the electrode to the workpiece. The arc ignites.
- The welding current flows and immediately assumes the value of the ignition current I St.
- HF switches off.
- The welding current ramps up to the main current I 1 (AMP) in the selected up-slope time t UP.

If torch trigger 2 is pressed together with torch trigger 1 during the main current phase, the welding current decreases to the secondary current I 2 (AMP%) in the set slope time t S1.

If torch trigger 2 is released, the welding current increases again to the main current AMP in the set slope time t S2. The parameters t S1 and t S2 can be set in the Expert menu (TIG) > *see 5.3.4 chapter*.

2nd cycle:

- Release torch trigger 1.
- The main current falls to the end-crater current I Ed (minimum current) in the set down-slope time t dn.

If the 1st torch trigger is pressed during the down-slope time,
the welding current returns to the set main current AMP

- Main current reaches the end-crater current I Ed; the arc is extinguished.
- Set gas post-flow time GPt elapses.

When the foot-operated remote control is connected, the machine switches automatically to non-latched operation. The up- and down-slopes are switched off.

5.3.6.3 Latched mode

Selection

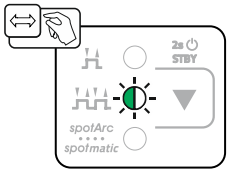


Figure 5-25

Sequence

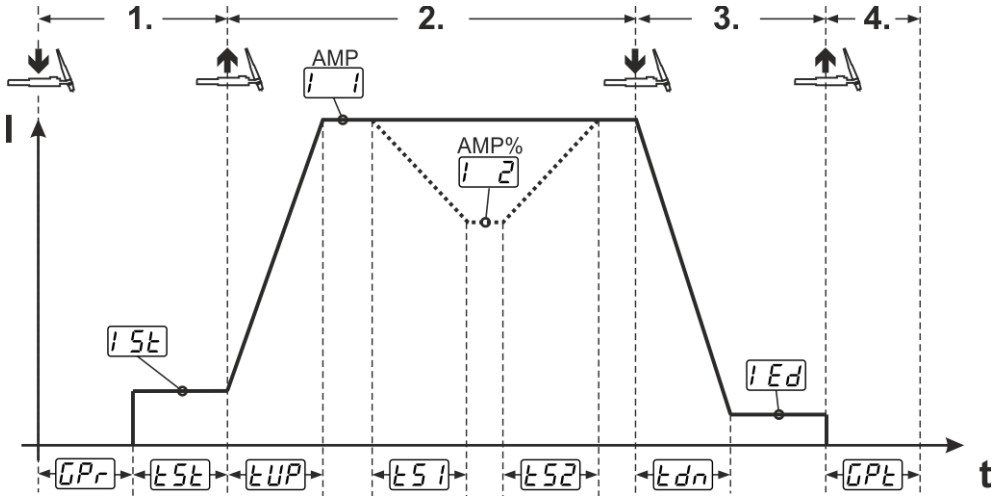


Figure 5-26

1st cycle

- Press torch trigger 1 GPr, the gas pre-flow time elapses.
- HF start pulses jump from the electrode to the workpiece. The arc ignites.
- Welding current flows and immediately assumes the set ignition current I SE (search arc at minimum setting). HF switches off.
- Ignition current flows at least for the start time tSE or as long as the torch trigger is held.

2nd cycle

- Release torch trigger 1.
- The welding current ramps up to the main current I 1 (AMP) in the selected upslope time tUP.

Switching from the main current AMP to secondary current I 2 (AMP%):

- Press torch trigger 2 or
- Tap torch trigger 1 (torch modes 1–6).

If torch trigger 2 is pressed together with torch trigger 1 during the main current phase, the welding current decreases to the secondary current I 2 (AMP%) in the set slope time tS1.

Once torch trigger 2 is released, the welding current increases again to the main current AMP in the set slope time tS2. The parameters tS1 and tS2 can be set in the Expert menu (TIG) > *see 5.3.4 chapter*.

3rd cycle

- Press torch trigger 1.
- The main current decreases to the end-crater current I Ed within the set down-slope time tdn.

Once the main current phase I 1 AMP has been reached, you can shorten the welding sequence by tapping torch trigger 1 (third cycle will be omitted).

4th cycle

- Release torch trigger 1; arc is extinguished.
- Set gas post-flow time GPt runs.

When the foot-operated remote control is connected, the machine switches automatically to non-latched operation. The up- and down-slopes are switched off.

Alternative welding start (tapping start):

For the alternative welding start, the durations of the first and second cycle are defined by the set process times only (tapping the torch trigger in the gas pre-low phase GPr).

To activate this function, set a two-digit torch mode (11-1x) at the machine control. This function can also be deactivated completely when required (welding stop by tapping remains active). To do so, the tPS parameter must be switched to oFF in the machine configuration menu > *see 5.12 chapter*.

5.3.6.4 spotArc

This process is suitable for tack welding or joint welding of metal sheets made from steel and CrNi alloys up to a thickness of approximately 2.5 mm. Metal sheets of different thicknesses can also be welded on top of one another. As this is a one-sided process, it is also possible to weld metal sheets onto tubular sections such as round or square pipes. In arc spot welding, the arc melts through the upper metal sheet and the lower metal sheet is melted onto it. This produces flat, fine-textured welding tacks which require little or no post weld work, even in visible areas.

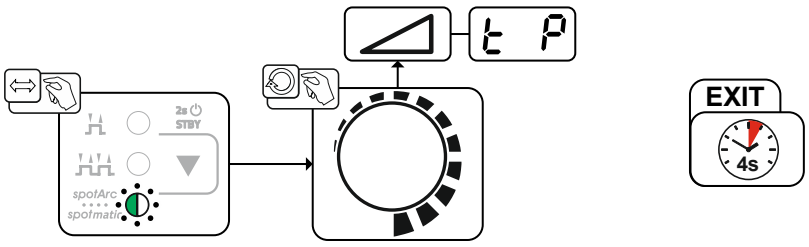


Figure 5-27

The up-slope and down-slope times should be set to “0” to achieve an effective result.

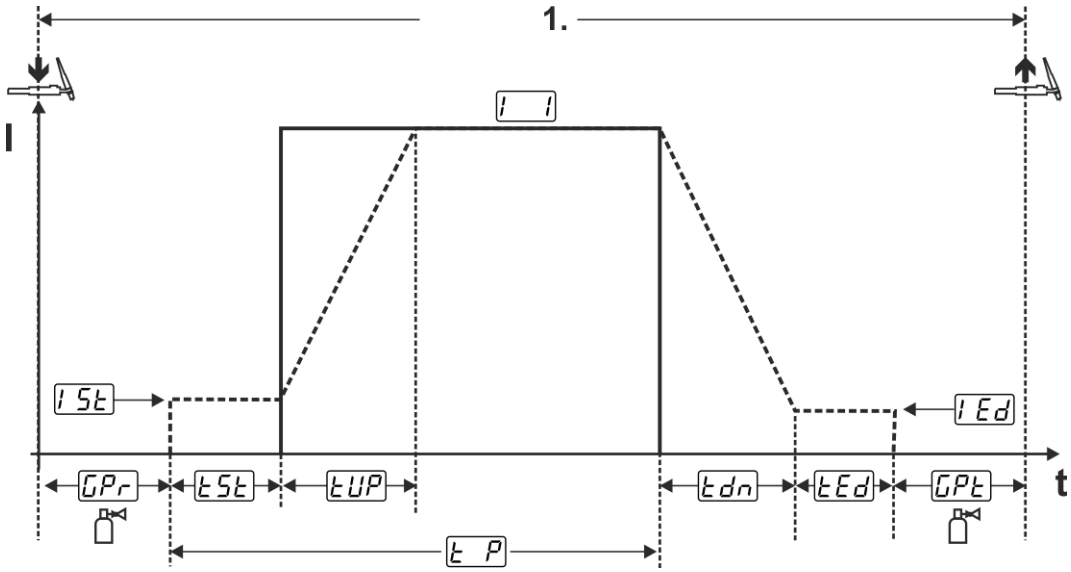


Figure 5-28

Sequence:

- Press torch trigger and hold down.
- The gas pre-flow time elapses.
- Arc ignites (main arc ignition for plasma / HF ignition at TIG)
- The welding current flows and immediately assumes the value of the ignition current I St.
- HF switches off.
- The welding current ramps up to the main current tUP within the set up-slope time I 1 (AMP) .

The process ends when the set spotArc.time elapses or by releasing the torch trigger. With the spotArc function enabled, the Automatic Puls pulse variant is activated as well. If required, the function can be disabled by pressing the pulsed welding push-button.

5.3.7 spotmatic (Plasma)

In contrast to the operating modespotArc, different time ranges of the point time can be selected.

The duration is set in the machine configuration menu using parameter StS > *see 5.12 chapter*

5.3.8 spotmatic (TIG)

In contrast to the spotArc operating mode, the arc is not ignited by pressing the torch trigger as is usual, but by briefly touching the tungsten electrode against the workpiece. The torch trigger is used for welding process activation. Activation is indicated by flashing of the spotArc/spotmatic signal light. The process can be activated separately for each spot or also on a permanent basis. The setting is controlled using the SSP process activation parameter in the configuration menu > *see 5.12 chapter*:

- Separate process activation (SSP > on):
  The welding process has to be reactivated for every arc ignition by pressing the torch trigger. Process activation is automatically terminated after 30 s of inactivity.
- Permanent process activation (SSP > oFF):
  The welding process is activated by pressing the torch trigger once. The following arc ignitions are initiated by shortly touching the tungsten electrode against the workpiece. Process activation is terminated either by pressing the torch trigger again or automatically after 30 s of inactivity.

For spotmatic the separate process activation and the short spot time setting range are enabled by default.

Ignition by touching the tungsten electrode against the workpiece can be disabled in the machine configuration menu with parameter SPn. In this case the function works as with spotArc, but the spot time setting range can be selected in the machine configuration menu.

The duration is set in the machine configuration menu using parameter StS > *see 5.12 chapter*

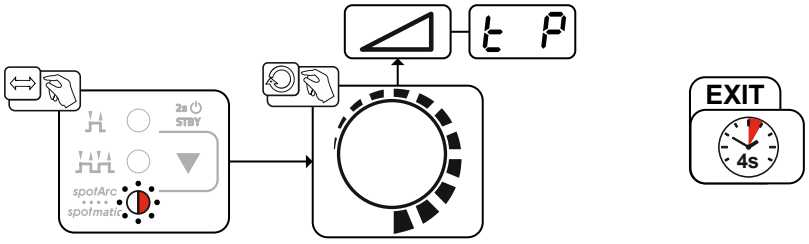


Figure 5-29

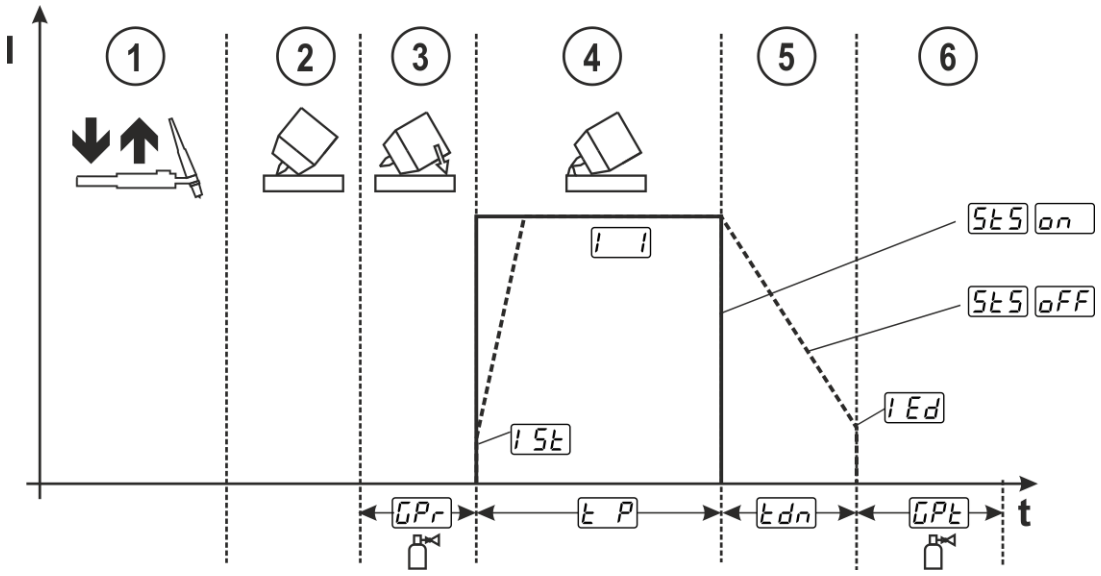


Figure 5-30

As an example the process is shown with HF ignition. Arc ignition with lift arc is also possible, however > *see 5.3.2 chapter*.

Selecting the process activation type for the welding process > *see 5.12 chapter*.

Up-slope and down-slope times possible for long spot time setting range (0.01–20.0 s) only.

① Press and release torch trigger (tap) to activate the welding process.

② Touch the torch gas nozzle and tungsten electrode tip carefully against the workpiece.

③ Incline the welding torch over the torch gas nozzle until there is a gap of approx. 2–3 mm between the electrode tip and the workpiece. Shielding gas flows during the set gas pre-flow time GPr. The arc ignites and the previously set ignition current I St flows.

④ The main current phase I 1 ends when the set t P spot time elapses.

⑤ For long-time spot welding only (parameter StS = oFF):
The welding current decreases to the end-crater current I Ed within the set down-slope time tdn.

⑥ The gas post-flow time GPt elapses and the welding process ends.

Press and release the torch trigger (tap) to reactivate the welding process (only for separate process activation). Touching the welding torch with the tungsten electrode tip against the workpiece again will initiate the next welding processes.

5.3.8.1 Non-latched operation, version C

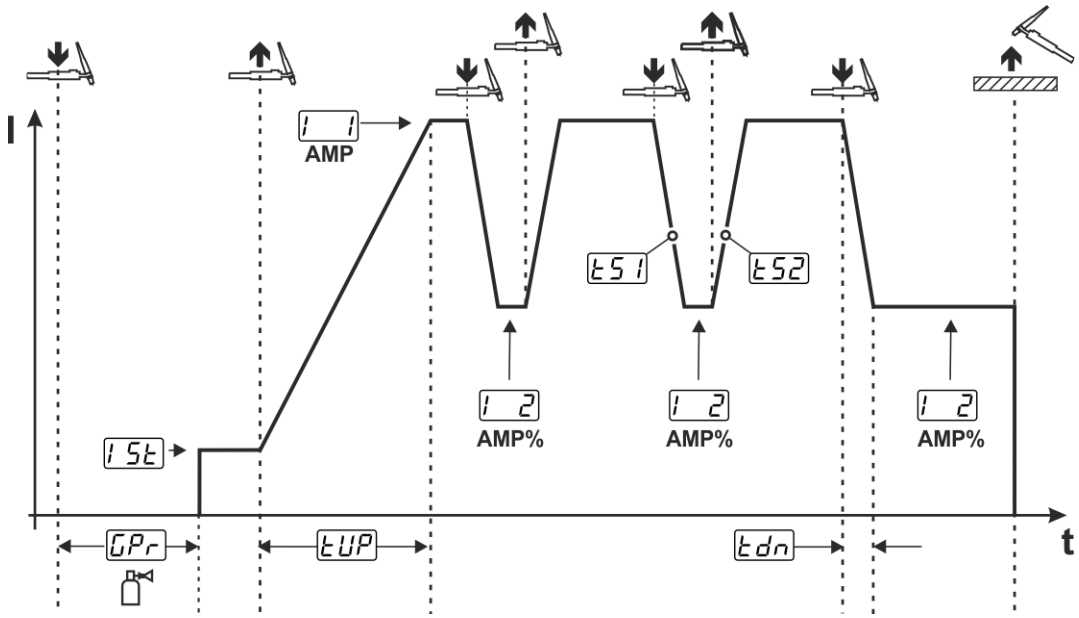


Figure 5-31

1st cycle

- Press torch trigger 1 GPr, the gas pre-flow time elapses.
- HF ignition pulses jump from the electrode to the workpiece. The arc ignites.
- Welding current flows and immediately assumes the set ignition current I St (search arc at minimum setting). HF switches off.

2nd cycle

- Release torch trigger 1.
- The welding current ramps up to the main current AMP in the selected up-slope time tUP.

Pressing torch trigger 1 starts the slope tS1 from main current AMP to secondary current I 2 AMP%. Releasing the torch trigger starts the slope tS2 from the secondary current AMP% and back to the main current AMP. This process can be repeated as frequently as required.
The welding process is stopped by interrupting the arc in the secondary current (remove the welding torch from the workpiece until the arc is extinguished, no re-ignition).

The slope times tS1 and tS2 can be set in the Expert menu > *see 5.3.4 chapter*.

This operating mode must be enabled (parameter 2tc) > *see 5.12 chapter*.

5.4 Recurring welding tasks

The user has additional memory locations at their disposal to save recurring or different welding tasks on a permanent basis (101 plasma JOBs / 8 WIG JOBs). To do so, simply select the required memory location and set the welding task as described previously.

Switching a JOB is only possible if no welding current flows. Up-slope and down-slope times can be set individually for latched and non-latched operation.

Selection

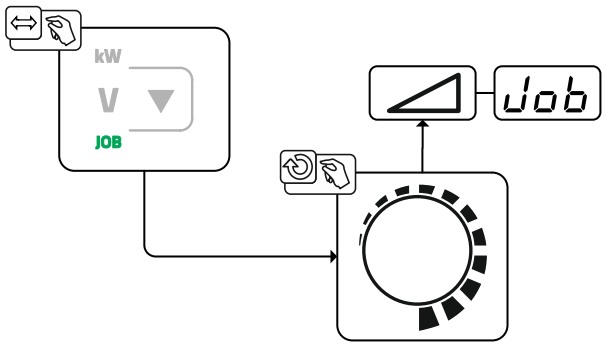


Figure 5-32

When one or more of the recurring welding tasks has been selected, the JOB signal light comes on.

5.5 Pulse welding

The following pulse types can be selected:

- Automated pulsing
- Thermal pulsing
- Metallurgical pulsing
- Average value pulsing

5.5.1 Automated pulses

The automated pulsing pulse variant is only activated for DC welding in combination with the spotArc operating mode. The current-dependent pulse frequency and balance create vibrations in the weld pool that have a positive effect on the gap bridging. The required pulse parameters are automatically defined by the machine control. If required, the function can be disabled by pressing the pulsed welding push-button.

Selection

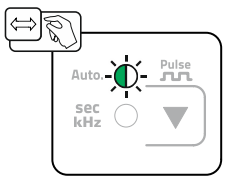


Figure 5-33

5.5.2 Thermal pulsing

The operation sequences basically match the standard welding sequences, but there is an additional switching back and forth between the main current AMP (pulse current) and the secondary current AMP% (pulse pause current) at the set times. Pulse and pause times and the pulse edges (t51 and t52) are entered in seconds on the control.

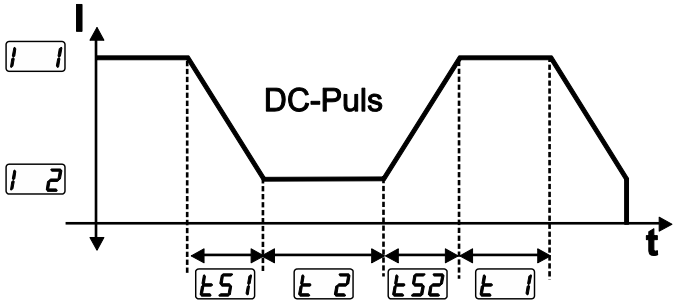


Figure 5-34

Selection

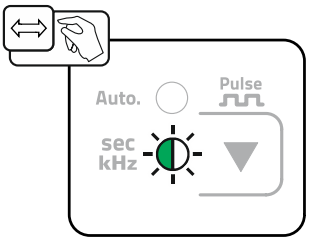


Figure 5-35

Pulse time setting

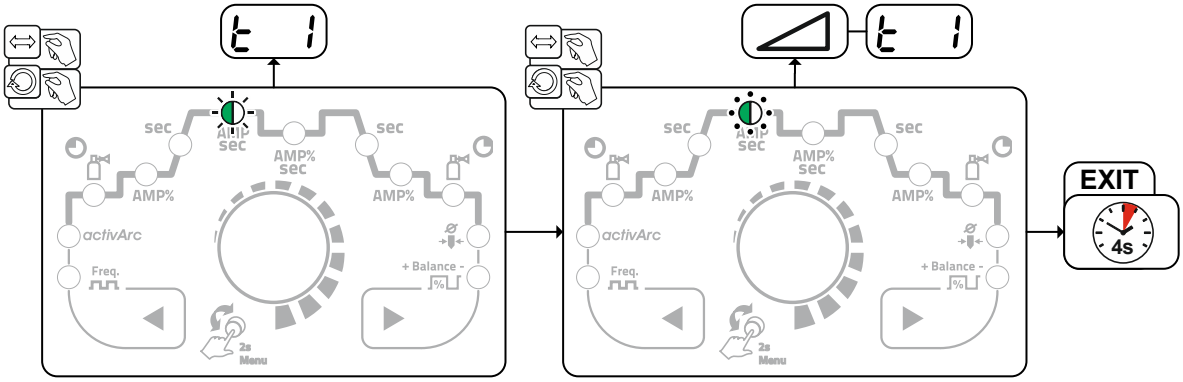


Figure 5-36

Pulse pause setting

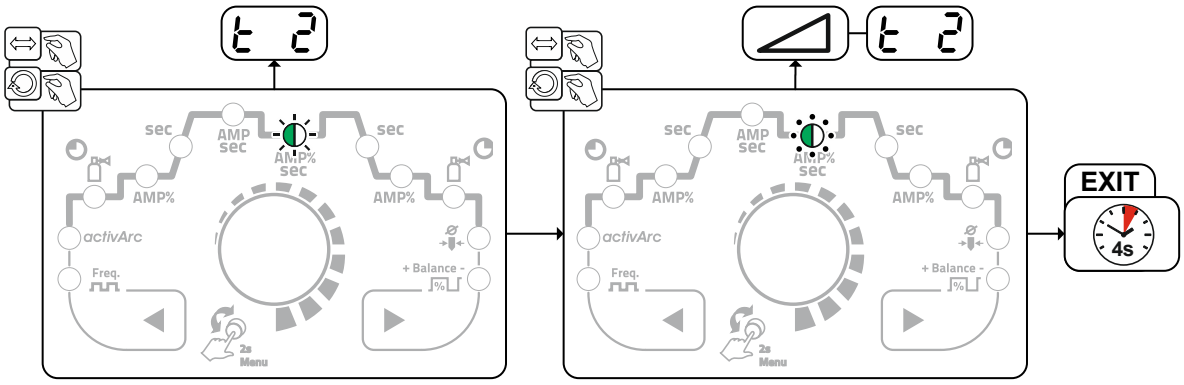


Figure 5-37

Pulse edge setting

The t51 and t52 pulse edges can be set in the Expert menu (TIG) > *see 5.3.4 chapter*.

5.5.3 Pulsed welding in the upslope and downslope phases

The pulse function can also be deactivated if necessary during the up-slope and down-slope phases (parameter PSL) > *see 5.12 chapter*.

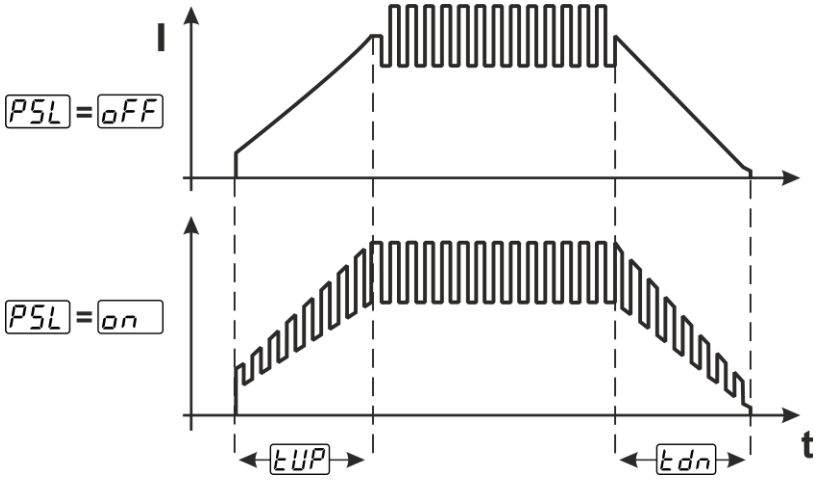


Figure 5-38

5.5.4 Metallurgical pulsing (kHz pulsing)

Metallurgical pulsing (kHz pulsing) uses the plasma force (arc force) occurring at high currents which allows you to achieve a constricted arc with concentrated heat input. Unlike thermal pulsing, no times are set; a frequency FrE and the balance bAL are set instead. The pulsing process also occurs during the up-slope and down-slope phase.

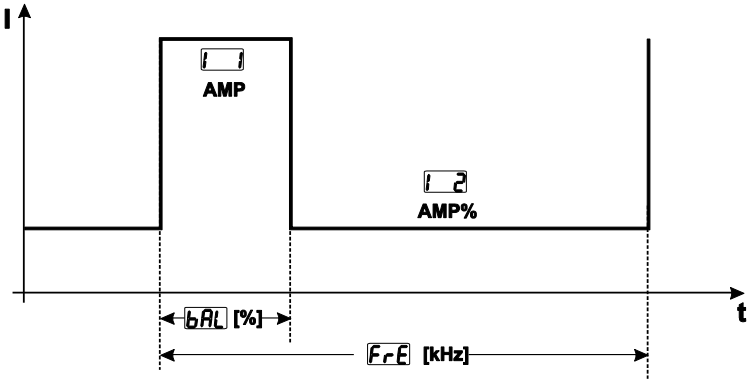


Figure 5-39

Selection

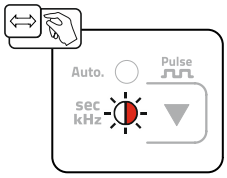


Figure 5-40

Balance setting

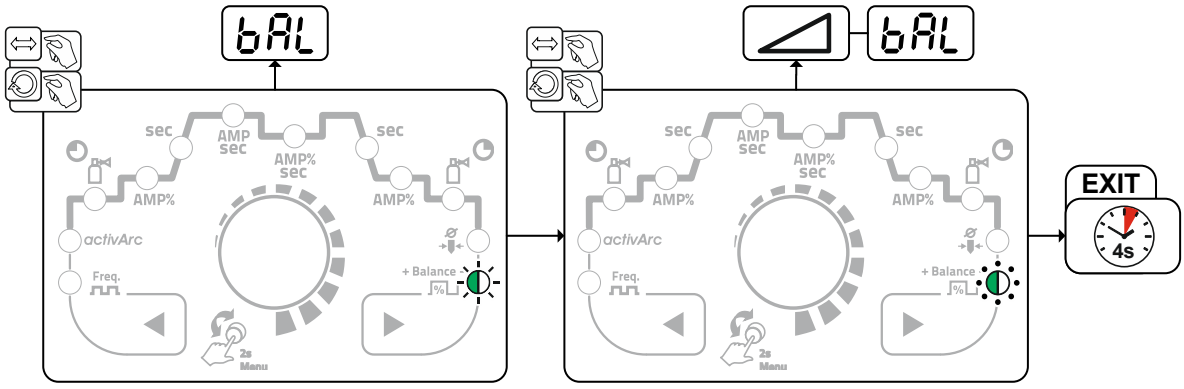


Figure 5-41

Frequency setting

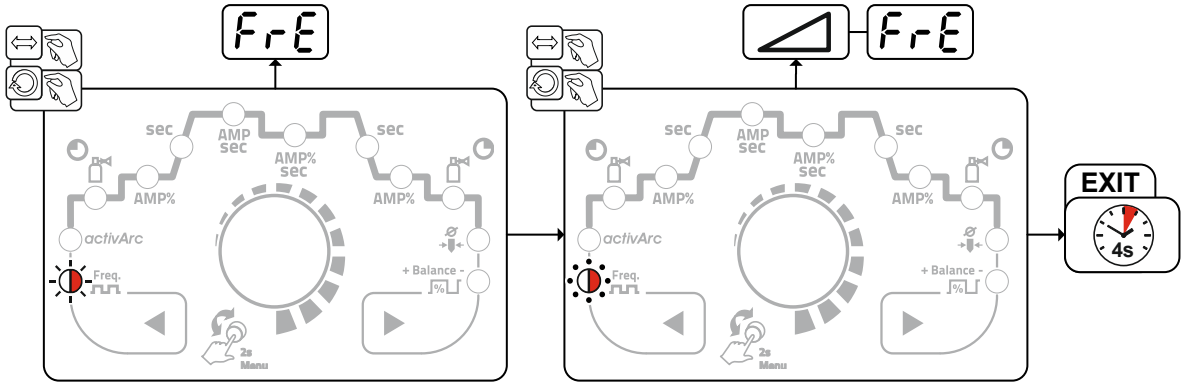


Figure 5-42

5.5.5 Average value pulse welding

A special feature with average value pulses is that the power source will always maintain the preset average value. This makes this method especially suitable for welding according to welding procedure specifications.

To activate average value pulses in conjunction with the metallurgical pulsing variant, the PU2 parameter in the machine configuration menu must be switched to on.

To activate average value pulses in conjunction with the thermal pulsing variant, the PAu parameter in the machine configuration menu must be switched to on.

Once the function is activated, the red signal lights for the main current AMP and secondary current AMP% light up at the same time.

Average value pulse welding means that the system switches between two currents periodically, with an average current value (AMP), a pulse current (Ipuls), a balance (bAL) and a frequency (FrE) having been defined first. The predefined ampere current average value is decisive, and the pulse current (Ipuls) is defined by the IPL parameter as a percentage of the average current value (AMP). The IPL parameter is set in the Expert menu > *see 5.3.4 chapter*.

The pulse pause current (IPP) is not set; the machine control calculates the value instead to ensure that the average value of the welding current (AMP) is maintained.

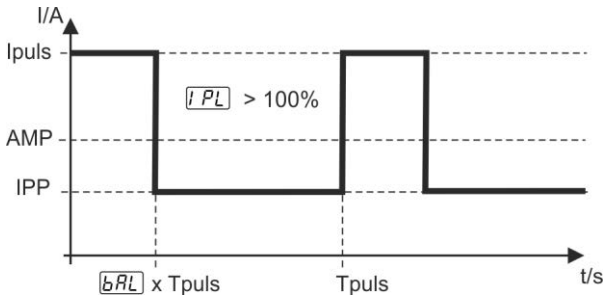


Figure 5-43

AMP = main current (average value), e.g. 100 A

Ipuls = pulse current = IPL x AMP, e.g. 140% x 100 A = 140 A

IPP = pulse pause current

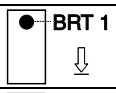
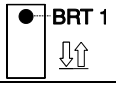
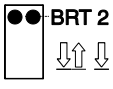
Tpuls = duration of one pulse cycle = 1/FrE, e.g. 1/100 Hz = 10 ms

bAL = balance

5.6 Welding torch (operating variants)

Different torch versions can be used with this machine.
Functions on the operating elements, such as torch triggers (BRT), rockers or potentiometers, can be modified individually via torch modes.

Explanation of symbols for operating elements:

Symbol	Description
	Press torch trigger
	Tap torch trigger
	Tap and press torch trigger

5.6.1 Tapping function (tap torch trigger)

Tapping function: Swiftly tap the torch trigger to change the function. The set torch mode determines the operating mode.

5.6.2 Torch mode setting

Modes 1 to 6 and 11 to 16 are available to the user. Modes 11 to 16 feature the same functionality as 1 to 6, but without the tapping function > *see 5.6.1 chapter* for the secondary current.

The functionality of the individual modes can be found in the corresponding torch type tables.

The torch modes are set using the torch configuration parameters "trd" in the machine configuration menu > torch mode "tod" > *see 5.12 chapter*.

Only the modes listed are suitable for the corresponding torch types.

5.6.3 Up/down speed

Functionality

Press and hold the up push-button:
Increase current up to the maximum value (main current) set in the power source.

Press and hold the down push-button:
Decrease current to the minimum value.

Use the machine configuration menu > *see 5.12 chapter* to set the up/down speed parameter uUd which determines the speed with which a current change becomes effective.

5.6.4 Current jump

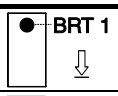
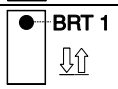
By tapping the corresponding torch trigger the welding current can be determined in an adjustable jump range. Each tap will cause the welding current to jump up or down by the defined value.

The “current jump” parameter dI is set in the machine configuration menu > *see 5.12 chapter*.

5.6.5 Standard TIG torch (5-pole)

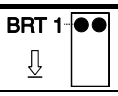
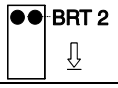
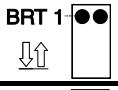
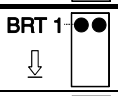
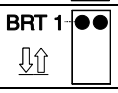
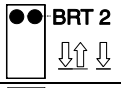
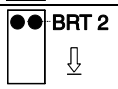
Standard torch with one torch trigger

Figure	Operating elements	Explanation of symbols
		BRT1 = torch trigger 1 (welding current on/off; secondary current via tapping function)

Functions	Mode	Operating elements
Welding current on/off	1 (ex works)	
Secondary current (latched operation)		

Standard torch with two torch triggers

Figure	Operating elements	Explanation of symbols
		BRT1 = torch trigger 1 BRT2 = torch trigger 2

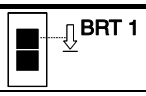
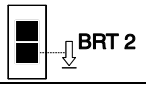
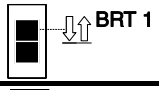
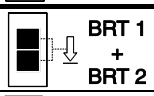
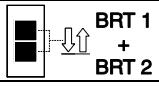
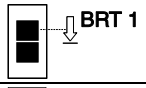
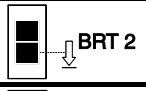
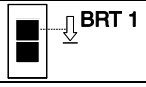
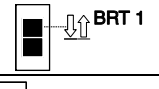
Functions	Mode	Operating elements
Welding current on/off	1 (ex works)	
Secondary current		
Secondary current (tapping function)[1])/(latched operating mode)		
Welding current on/off	3	
Secondary current (tapping function)[1])/(latched operating mode)		
Up function[2]		
Down function[2]		

[1] > *see 5.6.1 chapter*

[2] > *see 5.6.3 chapter*

Standard torch with one rocker (rocker, two torch triggers)

Figure	Operating elements	Explanation of symbols
		BRT 1 = torch trigger 1 BRT 2 = torch trigger 2

Functions	Mode	Operating elements
Welding current on/off	1 (ex works)	
Secondary current		
Secondary current (tapping function)[1])/(latched operating mode)		
Welding current on/off	2	
Secondary current (tapping function[1])		
Up function[2]		
Down function[2]		
Welding current on/off	3	
Secondary current (tapping function)[1])/(latched operating mode)		
Up function[2]		
Down function[2]		

[1] *> see 5.6.1 chapter*

[2] *> see 5.6.3 chapter*

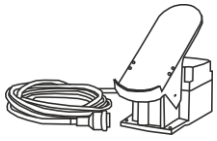
5.7 Remote control

The operation of the remote control and its settings are directly dependent on the configuration of the respective welding machine or wire feed unit. The settings are defined by changeover switches or by setting special parameters (dependent on the control).

The position of the key switch, to protect against unauthorised use, also has a direct influence on the operation of the respective remote control.

The remote controls are operated on the 19-pole remote control connection socket (analogue).

5.7.1 RTF1 19POL



Functions

- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Start/stop welding operation (TIG)

5.7.1.1 RTF start ramp

The RTF start ramp function prevents the energy input at the start of welding from being too high and too fast should the user press the remote control pedal too fast and too strongly.

Example:
The user sets the main current at the welding machine to 200 A. The user presses the remote control pedal very quickly down by approx. 50% of the pedal travel.

- RTF switched on: The welding current increases in a linear (slow)ramp to approx. 100 A.
- RTF switched off: The welding current immediately jumps to approx. 100 A.

The RTF start ramp function is activated/deactivated by the parameter FFr in the machine configuration menu > *see 5.12 chapter*.

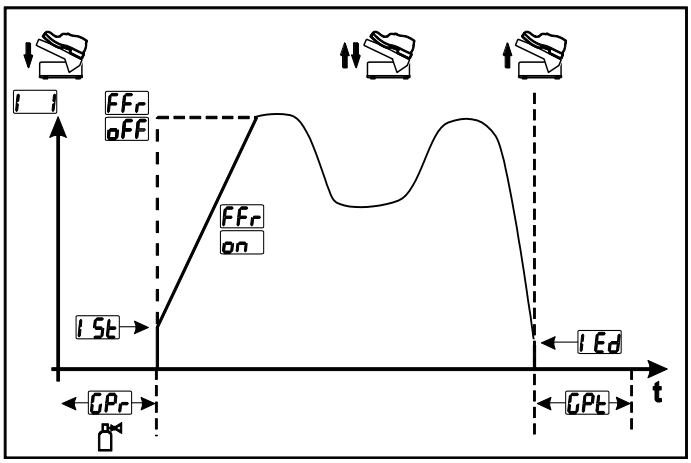


Figure 5-44

Symbol	Meaning
	**Actuate foot-operated remote control (start welding process)**
	**Operate foot-operated remote control (set welding current according to application)**
	**Release foot-operated remote control (end welding process)**
Display	**Setting/selection**
FFr	**RTF start ramp > *see 5.7.1.1 chapter*** on ------- Welding current rises to the specified main current level in a ramp function (ex works) oFF ------- Welding current immediately jumps to the specified main current level
GPr	**Gas pre-flow time**
I St	**Ignition current (as percentage, dependent on main current)**
I Ed	**End-crater current** Setting range in percent: depending on main current Setting range, absolute: Imin to Imax.
GPt	**Gas post-flow time**

5.7.1.2 RTF response

This function controls the current response during the main current phase. The user can choose between linear and logarithmic response. The logarithmic setting is especially suited for welding with low currents, e.g. for thin panels, as the logarithmic response enables a better control of the welding current.

In the machine configuration menu, the RTF response function [Frt] can be toggled between linear response [Lin] and logarithmic response [LoG] (ex works) > *see 5.12 chapter*.

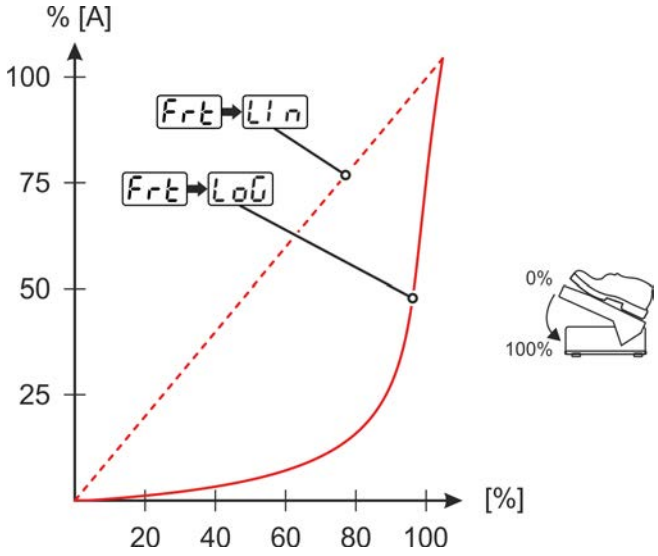


Figure 5-45

5.7.2 RTF1 -, RT1 -, RTG1 19POL

- Select the maximum welding current at the welding machine.

Infinitely adjustable welding current (0% - 100%) depending on the main current preselected at the welding machine.

- Setting of operating point directly at the welding location.

5.7.3 RTP1 19POL

- Select the maximum welding current at the welding machine.
- Connect the remote control to the welding machine (observe the standard operating manual of the welding machine).
- Set welding process TIG or MMA.
- Set pulsing, spot welding or standard operation.

Operating mode Pulsing

- Set pulse current and pulse pause current on the remote control.

Example with the following settings:

maximum welding current on the welding machine:	120A
Pulse current on the remote control:	50%
Pulse pause current on the remote control:	25%

Result:

Pulse current	= 60A (120A x 50%)
Pulse pause current	= 15A (120A x 50% x 25%)

- Set pulse time t1 and pulse pause time t2.

Spot welding operating mode

- Set point current on the remote control.
- Set the spot time (The rotary knob is assigned a double function, therefore the the set value is to be multiplied by 10).

Example with the following settings:

Spot time: 1.5sec.

Result:

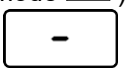
1.5sec. x 10 = spot time 15sec.

Standard operation

- Set welding current I1 (0-100% of rotary knob (AMP) on the welding machine)
- Set the secondary current I2 (0-100% of the rotary knob), accessible via the 2nd torch trigger.

5.8 Power-saving mode (Standby)

You can activate the power-saving mode by either pressing the push-button > *see 4.3 chapter* for a prolonged time or by setting a parameter in the machine configuration menu (time-controlled power-saving mode SbA) > *see 5.12 chapter*.



When power-saving mode is activated, the machine displays show the horizontal digit in the centre of the display only.

Pressing any operating element (e.g. turning a rotary knob) deactivates power-saving mode and the machine is ready for welding again.

5.9 Access control

The machine control can be locked to secure it against unauthorised or unintentional adjustment. The access block has the following effect:

- The parameters and their settings in the machine configuration menu, Expert menu and operation sequence can only be viewed but not changed.
- Welding procedure and welding current polarity cannot be changed.

The parameters for setting the access block are configured in the machine configuration menu > *see 5.12 chapter*.

Enabling access block

- Assign the access code for the access block: Select parameter cod and select a number code (0–999).
- Enable access block: Set parameter Loc to access block enabled on.

The access block activation is indicated by the "Access block active" signal light > *see 4.3 chapter*.

Disabling access block

- Enter the access code for the access block: Select parameter cod and enter the previously selected number code (0–999).
- Disable access block: Set parameter Loc to access block disabled oFF. The only way to disable the access block is to enter the selected number code.

5.10 Interfaces for automation

⚠ WARNING

Do not carry out any unauthorised repairs or modifications!
To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!
The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

☞ ***Damage to the machine due to improper connection!***
Unsuitable control leads or incorrect connection of input and output signals can cause damage to the machine.

- ***Only use shielded control leads!***
- ***If the machine is to be operated with control voltages connection via suitable isolation amplifiers is required!***
- ***To control the main or secondary current via control voltages, the relevant inputs must be enabled (see specification for activation of control voltage).***

5.10.1 Automation interface

This accessory component is only available as a “factory-fit option”.

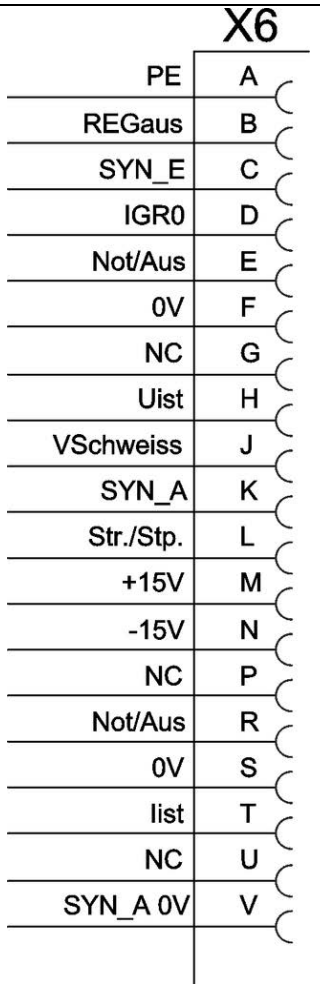
⚠ WARNING

No function of the external interrupt equipment (emergency stop switch)!
If the emergency stop circuit has been set up using an external interrupt equipment connected to the interface for automated welding, the machine must be configured for this setup. If this is not observed, the power source will ignore the external interrupt equipment and will not shut down!

- Remove jumper 1 on the corresponding control board (to be done only by qualified service personnel)!

Pin	Signal shape	Designation
A	Output	PE Connection for cable screen
B	Output	REGaus For servicing purposes only
C	Input	SYN_E Synchronisation for master/slave operation
D	Input (no c.)	IGRO Current flows signal I>0 (maximum load 20mA / 15V) 0V = welding current flowing
E **+** **R**	Input Output	Not/Aus Emergency stop for higher level shut-down of the power source. To use this function, jumper 1 must be unplugged on PCB T320/1 in the welding machine. Contact open = welding current off
F	Output	0V Reference potential
G	-	NC Not assigned
H	Output	Uist Actual welding voltage, measured on pin F, 0-10V (0V = 0V, 10V = 100V)
J		Vschweiss Reserved for special purposes
K	Input	SYN_A Synchronisation for master/slave operation
L	Input	Str/Stp Start / stop welding current, same as torch trigger. Only available in non-latched operating mode. +15V = start, 0V = stop
M	Output	+15V Voltage supply +15V, max. 75mA
N	Output	-15V Voltage supply -15V, max. 25mA
P	-	NC Not assigned
S	Output	0V Reference potential
T	Output	Iist Actual welding current, measured on pin F; 0-10V (0V = 0A, 10V = 1000A)
U		NC
V	Output	SYN_A 0V Synchronisation for master/slave operation

Diagram



5.10.2 Remote control connection socket, 19-pole

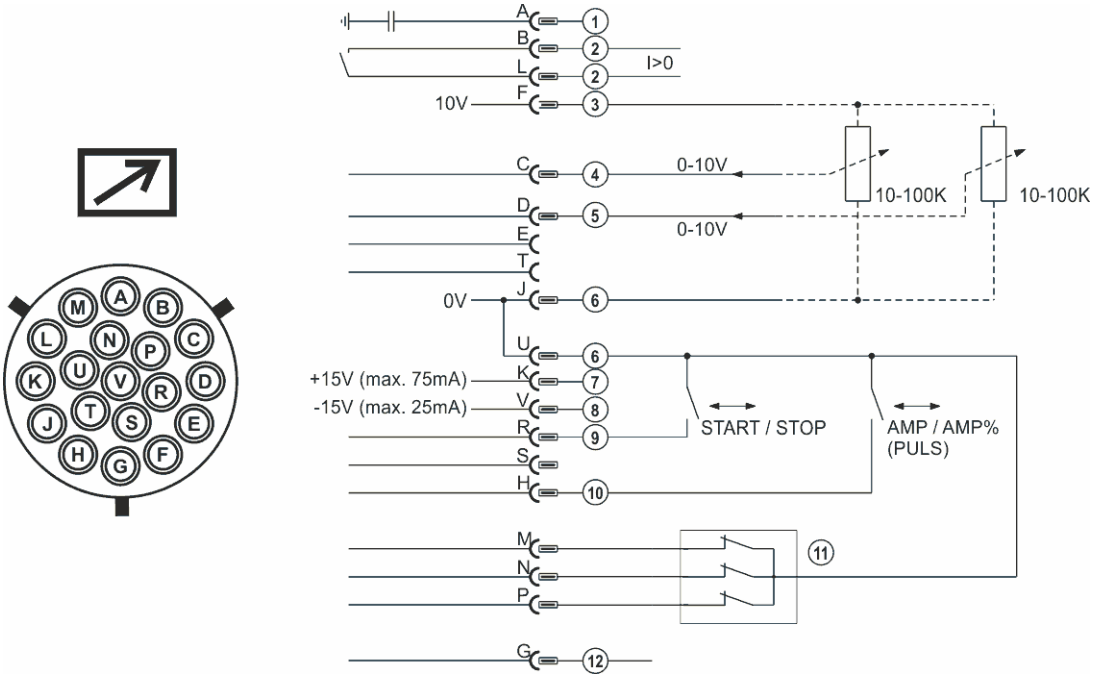


Figure 5-46

Pos.	Pin	Signal shape	Designation
1	A	Output	Connection for cable screen (PE)
2	B/L	Output	Current flows signal I>0, galvanically isolated (max. +- 15V/100mA)
3	F	Output	Reference voltage for potentiometer 10V (max. 10mA)
4	C	Input	Control value specification for main current, 0-10V (0V = I_{min}, 10V = I_{max})
5	D	Input	Control value specification for secondary current, 0-10V (0V = I_{min}, 10V = I_{max})
6	J/U	Output	Reference 0V
7	K	Output	Power supply +15V, max. 75mA
8	V	Output	Power supply -15V, max. 25mA
9	R	Input	Start/Stop welding current
10	H	Input	Switching between main and secondary welding currents (pulses)
11	M/N/P	Input	Activation of control voltage specification Set all 3 signals to reference potential 0V to activate external control voltage specification for main and secondary currents
12	G	Output	Measured value $I_{SETPOINT}$ (1V = 100A)

5.10.3 RINT X12 robot interface

The standard digital interface for mechanised applications
(optional, retrofitting on the machine or external fitting by the customer)

Functions and signals:

- Digital inputs: start/stop, operating modes, JOB and program selection, inching, gas test
- Analogue inputs: control voltages, e.g. for welding performance, welding current, etc.
- Relay outputs: process signal, ready for welding, system composite fault, etc.

5.10.4 BUSINT X11 industrial bus interface

The solution for easy integration with automated production with e.g.

- Profinet/Profibus
- EnthernetIP/DeviceNet
- EtherCAT

etc.

5.11 PC interface

☞ ***Equipment damage or faults may occur if the PC is connected incorrectly!***
Not using the SECINT X10USB interface results in equipment damage or faults in signal transmission. The PC may be destroyed due to high frequency ignition pulses.

- ***Interface SECINT X10USB must be connected between the PC and the welding machine!***
- ***The connection must only be made using the cables supplied (do not use any additional extension cables)!***

PC300.Net welding parameter software

Set all welding parameters on the PC and simply transfer to one or more welding machines (accessory, set consisting of software, interface, connection leads)

- Manage up to 510 JOBs
- Exchange JOBs with the welding machine
- Online data communication
- Default settings for welding data monitoring
- Always up-to-date thanks to standard update function for new welding parameters
- Data backup by easy communication between power source and PC

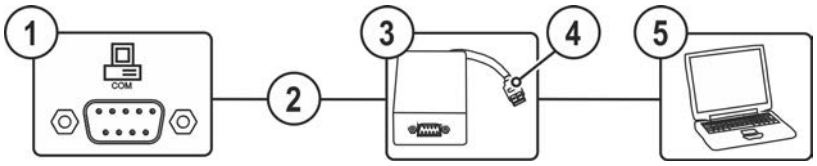


Figure 5-47

Item	Symbol	Description
1		**Connection socket (9-pole) - D-Sub** PC interface > *see 5.11 chapter*
2		**Connection cable, 9-pole, serial**
3		**SECINT X10 USB**
4		**USB connection** Connecting a Windows PC to SECINT X10 USB
5		**Windows PC**

5.12 Machine configuration menu

Basic machine settings are defined in the machine configuration menu.

5.12.1 Selecting, changing and saving parameters

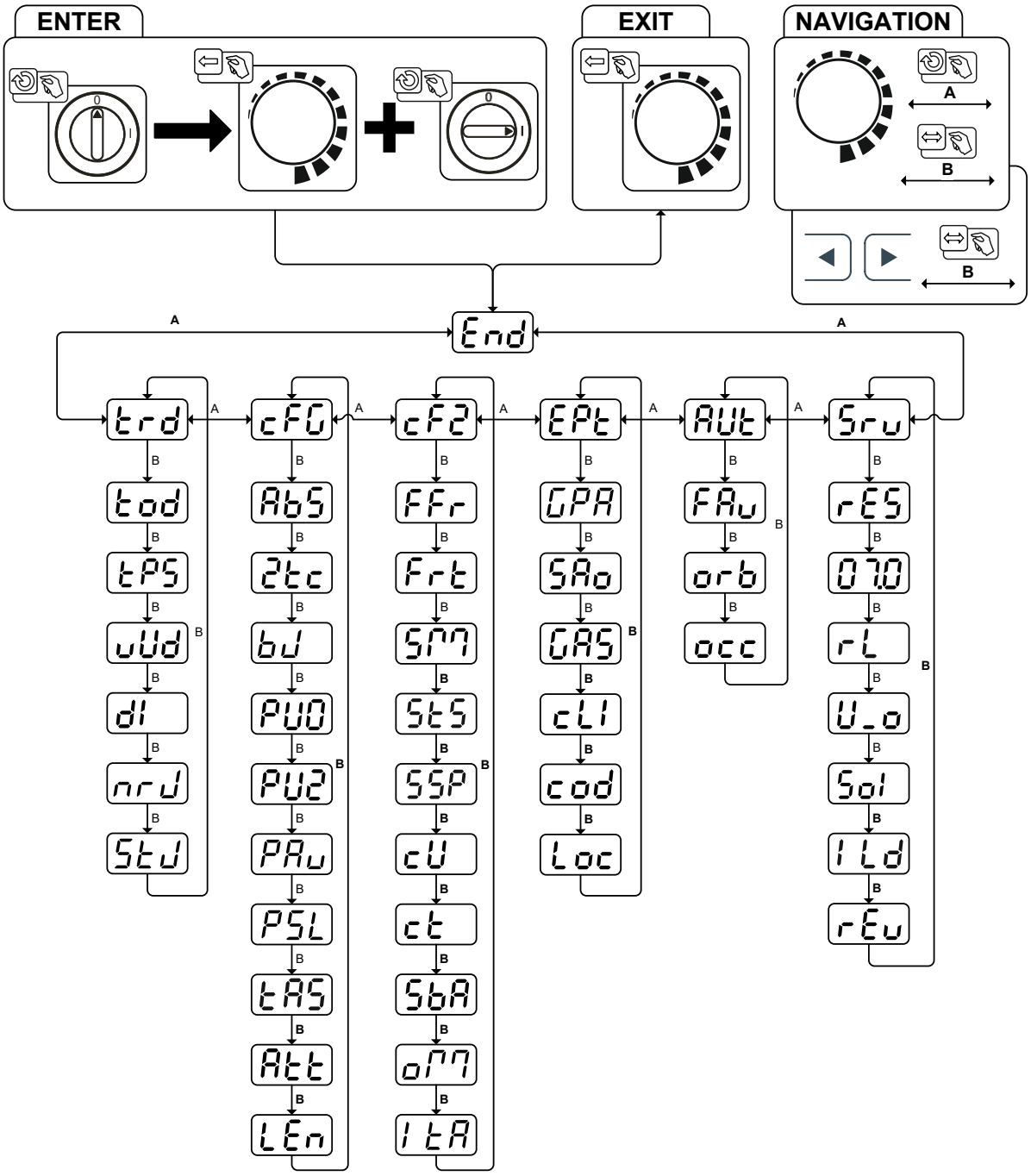


Figure 5-48

Display	Setting/selection
End	**Exit the menu** Exit
trd	**Torch configuration menu** Set welding torch functions
tod	**Torch mode (ex works 1) > *see 5.6.2 chapter***

Display	Setting/selection
tPS	**Alternative welding start – tapping start** Available from torch mode 11 (welding stop by tapping remains active). on ------- Function enabled (ex works) oFF ------- Function disabled
uUd	**Up/down speed > *see 5.6.3 chapter*** Increase value > rapid current change Decrease value > slow current change
dI	**Current jump > *see 5.6.4 chapter*** Current jump setting in ampere
nrJ	**Get JOB number** Set maximum selectable jobs (setting: 1 to 128, factory setting 10). Additional parameter after activating the BLOCK JOB function.
StJ	**Start JOB** Set first JOB to get (setting: 129 to 256, factory setting 129).
cFG	**Machine configuration** Settings for machine functions and parameter display
AbS	**Absolute value setting (ignition, secondary, end and hot start current) > *see 4.4.7 chapter*** on ------- Welding current setting, absolute oFF ------- Welding current setting, as a percentage of the main current (ex works)
2tc	**Non-latched operation (version C) > *see 5.3.8.1 chapter*** on ------- Function enabled oFF ------- Function disabled (ex works)
bJ	**RINT X12, JOB control for automation solutions** on ------ on oFF ------ off (factory setting)
PU0	**Pulsed TIG welding (thermal)** on ------- Function enabled (ex works) oFF ------- For special applications only
PU2	**TIG average value pulsing** on ------- Average value pulsing enabled oFF ------- Average value pulsing disabled (ex works)
PAu	**TIG average value pulsing** on ------- Average value pulsing enabled oFF ------- Average value pulsing disabled (ex works)
PSL	**Pulsed TIG welding (thermic) in the upslope and downslope phases > *see 5.5.3 chapter*** on ------- Function enabled (ex works) oFF ------- Function disabled
tAS	**TIG antistick > *see 5.3.3 chapter*** on ------- function active (factory setting). oFF ------- function inactive.
Att	**Show warnings > *see 7.1 chapter*** oFF ------ Function disabled (ex works) on ------- Function enabled
LEn	**Setting the system of units** mm ------- Units of length in mm, m/min. (metric system) inch ------- Unit of length in inches, ipm (imperial system)
cF2	**Machine configuration (second part)** Settings for machine functions and parameter display

Display	Setting/selection
FFr	**RTF start ramp > *see 5.7.1.1 chapter***
	on ------ Welding current rises to the specified main current level in a ramp function (ex works)
	oFF ------ Welding current immediately jumps to the specified main current level
FrE	**RTF response > *see 5.7.1.2 chapter***
	Lin ------ Linear response
	LoG ------ Logarithmic responsive (ex works)
SMM	**spotmatic operating mode > *see 5.3.8 chapter***
	Ignition by contact with the workpiece
	on ------ Function enabled (ex works)
	oFF ------ Function disabled
StS	**Spot time setting > *see 5.3.8 chapter***
	on ------ Short spot time, setting range 5 ms to 999 ms, increments of 1 ms (ex works)
	oFF ------ Long spot time, setting range 0.01 s to 20.0 s, increments of 10 ms (ex works)
SSP	**Process activation setting > *see 5.3.8 chapter***
	on ------ Separate process activation (ex works)
	oFF ------ Permanent process activation
cU	**Torch cooling mode**
	AUt ------ Automatic operation (ex works)
	on ------ Permanently enabled
	oFF ------ Permanently disabled
ct	**Welding torch cooling, post-flow time**
	Setting 1–60 min. (ex works 5 min.)
SbA	**Time-based power-saving mode > *see 5.8 chapter***
	Time to activation of the power-saving mode in case of inactivity.
	Setting oFF = disabled or numerical value 5-60 min..
oMM	**Operating mode switching via interface for automated welding**
	2t ----- Non-latched
	2tS ------ Special non-latched
ItA	**Re-ignition after arc interruption > *see 5.3.2.3 chapter***
	Job ------ JOB-dependent time (ex works 5 s).
	oFF ------ Function disabled or numerical value 0.1–5.0 s.
EPt	**Expert menu**
GPA	**Automatic gas post-flow function > *see 5.1.7.4 chapter***
	on ------ Function on
	oFF ------ Function off (factory setting)
SAo	**Error output to interface for automated welding, contact SYN_A**
	oFF ------ AC synchronisation or hot wire (ex works)
	FSn ------ Error signal, negative logic
	FSP ------ Error signal, positive logic
	Auc ------ AVC (Arc voltage control) connection
GAS	**Gas monitoring**
	Depending on where the gas sensor is situated, the use of a pilot static tube and the welding process monitoring phase.
	oFF ------ Function disabled (ex works).
	1 ------ Monitoring during the welding process. Gas sensor between gas valve and welding torch (with pilot static tube).
	2 ------ Monitoring prior to the welding process. Gas sensor between gas valve and welding torch (without pilot static tube).
	3 ------ Permanent monitoring Gas sensor between gas cylinder and gas valve (with pilot static tube).

Display	Setting/selection
cLI	**Minimum current limit (TIG) > *see 5.3.1 chapter*** Depending on the set tungsten electrode diameter oFF------- Function disabled on------- Function enabled (ex works)
cod	**Access control – access code** Setting: 000 to 999 (000 ex works)
Loc	**Access control > *see 5.9 chapter*** on------- Function enabled oFF------- Function disabled (ex works)
AUt	**Automation menu** [3]
FAu	**Fast take-over of control voltage (automation)** [3] on------- Function enabled oFF------- Function disabled (ex works)
orb	**Orbital welding** [3] oFF------- Function disabled (ex works) on------- Function enabled
occ	**Orbital welding** [3] Correction value for orbital current
Sru	**Service menu** Any changes to the service menu should be agreed with the authorised service personnel.
rES	**Reset (to factory setting)** oFF------- Disabled (ex works) cFG------- Reset the values in the machine configuration menu cPL------- Complete reset of all values and settings Resetting is performed when exiting the menu (End).
07.0 3c0	**Software version query (example)** 07.=------ system bus ID 03c0= --- version number System bus ID and version number are separated by a dot.
rL	**Cable resistance alignment > *see 5.3.5 chapter*** **Only qualified service personnel may change the parameters!**
U_o	
Sol	**TIG HF start (soft/hard) switching** on------- soft ignition (factory setting). oFF------- hard ignition.
ILd	**Ignition pulse limit** Setting 0 ms–15 ms (increments of 1 ms)
rEu	**PCB state – qualified service personnel only!**

[1] for AC welding machines only.

[2] For machines with filler wire (AW) only.

[3] for components for automated welding (RC) only.

6 Maintenance, care and disposal

6.1 General

⚠ DANGER

Risk of injury due to electrical voltage after switching off!
Working on an open machine can lead to fatal injuries!
Capacitors are loaded with electrical voltage during operation. Voltage remains present for up to four minutes after the mains plug is removed.

1. Switch off machine.
2. Remove the mains plug.
3. Wait for at last 4 minutes until the capacitors have discharged!

⚠ WARNING

Incorrect maintenance, testing and repair!
Maintenance, testing and repair of the machine may only be carried out by skilled and qualified personnel. A qualified person is one who, because of his or her training, knowledge and experience, is able to recognise the dangers that can occur while testing welding power sources as well as possible subsequent damage, and who is able to implement the required safety procedures.

Observe the maintenance instructions > *see 6.2 chapter*.

- In the event that the provisions of one of the below-stated tests are not met, the machine must not be operated again until it has been repaired and a new test has been carried out!

Repair and maintenance work may only be performed by qualified authorised personnel; otherwise the right to claim under warranty is void. In all service matters, always consult the dealer who supplied the machine. Return deliveries of defective equipment subject to warranty may only be made through your dealer. When replacing parts, use only original spare parts. When ordering spare parts, please quote the machine type, serial number and item number of the machine, as well as the type designation and item number of the spare part.

Under the specified ambient conditions and normal working conditions this machine is essentially maintenance-free and requires just a minimum of care.

Contamination of the machine may impair service life and duty cycle. The cleaning intervals depend on the ambient conditions and the resulting contamination of the machine. The minimum interval is every six months.

6.1.1 Cleaning

- Clean the outer surfaces with a moist cloth (no aggressive cleaning agents).
- Purge the machine venting channel and cooling fins (if present) with oil- and water-free compressed air. Compressed air may overspeed and destroy the machine fans. Never direct the compressed air directly at the machine fans. Mechanically block the fans, if required.
- Check the coolant for contaminants and replace, if necessary.

6.1.2 Dirt filter

The duty cycle of the welding machine decreases as an effect of the reduced cooling air volume. The dirt filter must be remove at regular intervals and cleaned by blowing out with compressed air (depending on the level of soiling).

6.2 Maintenance work, intervals

6.2.1 Daily maintenance tasks

Visual inspection

- Mains supply lead and its strain relief
- Gas cylinder securing elements
- Check hose package and power connections for exterior damage and replace or have repaired by specialist staff as necessary!
- Gas tubes and their switching equipment (solenoid valve)
- Check that all connections and wearing parts are hand-tight and tighten if necessary.
- Check correct mounting of the wire spool.
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Other, general condition

Functional test

- Operating, message, safety and adjustment devices (Functional test)
- Welding current cables (check that they are fitted correctly and secured)
- Gas tubes and their switching equipment (solenoid valve)
- Gas cylinder securing elements
- Check correct mounting of the wire spool.
- Check that all screw and plug connections and replaceable parts are secured correctly, tighten if necessary.
- Remove any spatter.
- Clean the wire feed rollers on a regular basis (depending on the degree of soiling).

6.2.2 Monthly maintenance tasks

Visual inspection

- Casing damage (front, rear and side walls)
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Check coolant tubes and their connections for impurities

Functional test

- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check wire guide elements (wire feed roll holder, wire feed nipple, wire guide tube) for tight fit. Recommendation for replacing the wire feed roll holder (eFeed) after 2000 hours of operation, see replacement parts).
- Check coolant tubes and their connections for impurities
- Check and clean the welding torch. Deposits in the torch can cause short circuits and have a negative impact on the welding result, ultimately causing damage to the torch.

6.2.3 Annual test (inspection and testing during operation)

A periodic test according to IEC 60974-4 "Periodic inspection and test" has to be carried out. In addition to the regulations on testing given here, the relevant local laws and regulations must also be observed.

For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at www.ewm-group.com!

6.3 Disposing of equipment

Proper disposal!
The machine contains valuable raw materials, which should be recycled, and electronic components, which must be disposed of.

- **Do not dispose of in household waste!**
- **Observe the local regulations regarding disposal!**

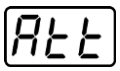
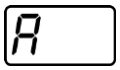
- According to European provisions (Directive 2012/19/EU on Waste of Electrical and Electronic Equipment), used electric and electronic equipment may no longer be placed in unsorted municipal waste. It must be collected separately. The symbol depicting a waste container on wheels indicates that the equipment must be collected separately.
  This machine has to be disposed of, or recycled, in accordance with the waste separation systems in use.
- According to German law (law governing the distribution, taking back and environmentally correct disposal of electric and electronic equipment (ElektroG)), used machines are to be placed in a collection system separate from unsorted municipal waste. The public waste management utilities (communities) have created collection points at which used equipment from private households can be disposed of free of charge.
- Information about returning used equipment or about collections can be obtained from the respective municipal administration office.
- In addition to this, returns are also possible throughout Europe via EWM sales partners.

7 Rectifying faults

All products are subject to rigorous production checks and final checks. If, despite this, something fails to work at any time, please check the product using the following flowchart. If none of the fault rectification procedures described leads to the correct functioning of the product, please inform your authorised dealer.

7.1 Warnings

Depending on the display options of the machine display, a warning message is displayed as follows:

Display type - machine control	Display
Graphic display	
two 7-segment displays	
one 7-segment display	

The cause of the warning is indicated by a corresponding warning number (see table).

The display of possible warning numbers depends on the machine version (interfaces/functions).

- In case of multiple warnings, these are displayed in sequence.
- Document machine warning and inform service personnel, if required.

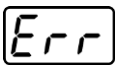
Warning code	Possible cause	Remedy
1	Machine excess temperature	Allow the machine to cool down
2	Half-wave failures	Check process parameters
3	Welding torch cooling warning	Check coolant level and refill if necessary
4	Gas warning	Check gas supply
5	See warning number 3	-
6	Welding consumable (wire electrode) fault	Check wire feeding (with machines with filler wire)
7	CAN bus failure	Inform service.
16	Protective gas warning	Check gas supply
17	Plasma gas warning	Check gas supply
18	Forming gas warning	Check gas supply
20	Coolant temperature warning	Check coolant level and refill if necessary
24	Coolant flow warning	Check coolant supply; check coolant level and, if necessary, fill up
28	Wire stock warning	Check wire feeding (with machines with filler wire)
32	Encoder malfunction, drive	Inform service.
33	Drive is operating under overload conditions	Adjust mechanical load
34	JOB unknown	Select alternatives JOB

The warnings can be reset by pressing a push-button (see table):

Machine control	Smart	Classic	Comfort	Smart 2 Comfort 2	Synergic
Pushbutton					

7.2 Error messages

Depending on the options of the machine display, a fault is shown as follows:

Display type - machine control	Display
Graphic display	
two 7-segment displays	
one 7-segment display	

The possible cause of the fault is signalled by a corresponding fault number (see table). In the case of an error, the power unit shuts down.

The display of possible error numbers depends on the machine version (interfaces/functions).

- If multiple errors occur, these are displayed in succession.
- Document machine errors and inform service staff as necessary.

Error	Possible cause	Remedy
3	Tacho error	Check wire guide / hose package.
	Wire feeder is not connected	Switch off cold wire mode in the machine configuration menu (off status). Connect the wire feeder.
4	Temperature error	Allow the machine to cool.
	Error in the emergency stop circuit (interface for automated welding)	Check the external shutdown devices. Check the jumper JP 1 on PCB T320/1.
5	Overvoltage	Switch off the machine and check the mains voltage.
6	Undervoltage	
7	Coolant error (with connected cooling unit only).	Check coolant level and top up if necessary.
8	Gas error	Check the gas supply.
9	Secondary overvoltage	Switch the machine off and on. If the error persists, notify Service.
10	PE error	
11	FastStop position	Slope “Acknowledge error” signal (0 to 1) using the robot interface (if present).
12	VRD error	Switch the machine off and on. If the error persists, notify Service.
16	Pilot arc fault	Check welding torch.
17	Filler wire error Excess current or deviation of the actual value from the wire target value.	Check the wire feed system (drives, hose packages, welding torches, process wire feed speed and robot travel speed) and correct if necessary.
18	Plasma gas error Target value specification deviates significantly from the actual value.	Check plasma gas supply (leak tightness, kinks, guide, connections, closure).
19	Shielding gas error Target value specification deviates significantly from the actual value	Check plasma gas supply (leak tightness, kinks, guide, connections, closure).
20	Coolant flow Coolant flow rate too low	Check cooling circuit (coolant level, leak tightness, kinks, guide, connections, closure).
22	Excess temperature in cooling circuit	Check cooling circuit (coolant level, temperature target value).
23	Excess temperature of the HF choke	Allow the machine to cool. Adjust processing cycle times if necessary.
24	Pilot arc ignition error	Check the wear parts of the plasma torch.

Error	Possible cause	Remedy
32	Electronics error (I>0 error)	Switch the machine off and on. If the error persists, notify Service.
33	Electronics error (Uact error)	
34	Electronics error (A/D channel error)	
35	Electronics error (slope error)	
36	Electronics error (S sign)	
37	Electronics error (temperature error)	Allow the machine to cool.
38	---	Switch the machine off and on. If the error persists, notify Service.
39	Electronics error (secondary overvoltage)	
40	Electronics error (I>0 error)	Inform service.
48	Ignition error	Check the welding process.
49	Arc interruption	Inform service.
51	Error in the emergency stop circuit (interface for automated welding)	Check the external shutdown devices. Check jumper JP 1 on PCB T320/1.
57	Auxiliary drive error, tacho error	Check the auxiliary drive (tacho – no signal, M3.51 defective > notify Service).
59	Incompatible component	Replace component.

7.3 Resetting welding parameters to the factory settings

All customised welding parameters that are stored will be replaced by the factory settings.

To reset the welding parameters or machine settings to the factory settings, select parameter rES in the service menu Sru > *see 5.12 chapter*.

7.4 Display machine control software version

The query of the software versions only serves to inform the authorised service staff. It is available in the machine configuration menu > *see 5.12 chapter*.

7.5 Checklist for rectifying faults

The correct machine equipment for the material and process gas in use is a fundamental requirement for perfect operation!

Legend	Symbol	Description
	↯	Fault/Cause
	🛠	Remedy

Functional errors

Mains fuse triggers

↯ Mains fuse triggers - unsuitable mains fuse

🛠 Set up recommended mains fuse > *see 8 chapter*.

↯ All machine control signal lights are illuminated after switching on

↯ No machine control signal light is illuminated after switching on

↯ No welding power

🛠 Phase failure > check mains connection (fuses)

↯ Connection problems

🛠 Make control lead connections and check that they are fitted correctly.

↯ Loose welding current connections

🛠 Tighten power connections on the torch and/or on the workpiece

Coolant error/no coolant flowing

↯ Insufficient coolant flow

🛠 Check coolant level and refill if necessary

↯ Air in the coolant circuit

🛠 Vent coolant circuit

Pore formation

- Inadequate or missing gas shielding
  - Check shielding gas setting and replace shielding gas cylinder if necessary
  - Shield welding site with protective screens (draughts affect the welding result)
  - Use gas lens for aluminium applications and high-alloy steels
- Unsuitable or worn welding torch equipment
  - Check size of gas nozzle and replace if necessary
- Condensation (hydrogen) in the gas tube
  - Purge hose package with gas or replace

Welding torch overheated

- Loose welding current connections
  - Tighten power connections on the torch and/or on the workpiece
  - Tighten contact tip correctly
- Overload
  - Check and correct welding current setting
  - Use a more powerful welding torch

Pilot arc ignites but no main arc forms

- Distance between workpiece and torch too high
  - Decrease distance to workpiece
- Contaminated workpiece surface
- Bad current transfer on ignition
  - Check the setting on the "Tungsten electrode diameter/Ignition optimisation" rotary dial and increase if necessary (higher ignition energy).
  - Setting the tungsten electrode
- Incompatible parameter settings
  - Check settings and correct if necessary

8 Technical data

Performance specifications and guarantee only in connection with original spare and replacement parts!

8.1 Microplasma 25

	Plasma	TIG
Welding current (I_2)	0,3 A to 20 A	2 A to 20 A
Welding voltage according to standard (U_2)	25,0 V to 25,8 V	10,1 V to 10,8 V
Plasma current (pilot arc)	2-6 A	
Duty cycle DC at 40° C [1]		
100 %	20 A	
Open circuit voltage (U_0)	95 V	
Ignition voltage (U_P)	12 kV	
Mains voltage (Tolerance)	1 x 230 V (-40 % to +15 %)	
Frequency	50/60 Hz	
mains fuse [2]	1 x 10 A	
Mains connection cable	H07RN-F3G2,5	
max. Connected load (S_1)	1,2 kVA	0,6 kVA
Generator rating (Rec.)	2 kVA	
Cos φ	0,99	
Protection class / Overvoltage category	I / III	
Contamination level	3	
Insulation class / protection classification	H / IP 23	
Residual current circuit breaker	Type B (recommended)	
Noise level [3]	<70 dB(A)	
Ambient temperature [4]	-25 °C to +40 °C	
Machine cooling / Torch cooling	Fan (AF) / Cooling unit, ext.	
Workpiece lead (min.)	16 mm^2	
EMC class	A	
Safety marking	S / CE / EAC	
Standards used	See declaration of conformity (appliance documents)	
Dimensions (l x b x h)	625 x 377 x 531 mm 24.6 x 14.8 x 20.9 inch	
Weight	36,2 kg 79.8 lb.	

[1] Load cycle: 10 min. (60 % DC ≙ 6 min. welding, 4 min. pause)

[2] Safety fuses are recommended DIAZED xxA gG. When using automatic cutouts, the "C" trigger characteristic must be used.

[3] Noise level during idle mode and operation under standard load according to IEC 60974- 1 at the maximum operating point.

[4] Ambient temperature dependent on coolant! Observe coolant temperature range!

8.2 Microplasma 55

	Plasma	TIG
Welding current (I_2)	0,3 A to 50 A	2 A to 50 A
Welding voltage according to standard (U_2)	25,0 V to 27,0 V	10,1 V to 12,0 V
Plasma current (pilot arc)	2-6 A	
Duty cycle DC at 40° C [1]		
100 %	50 A	
Open circuit voltage (U_0)	95 V	
Ignition voltage (U_P)	12 kV	
Mains voltage (Tolerance)	1 x 230 V (-40 % to +15 %)	
Frequency	50/60 Hz	
mains fuse [2]	1 x 16 A	1 x 10 A
Mains connection cable	H07RN-F3G2,5	
max. Connected load (S_1)	2,8 kVA	1,3 kVA
Generator rating (Rec.)	4 kVA	
Cos φ	0,99	
Protection class / Overvoltage category	I / III	
Contamination level	3	
Insulation class / protection classification	H / IP 23	
Residual current circuit breaker	Type B (recommended)	
Noise level [3]	<70 dB(A)	
Ambient temperature [4]	-25 °C to +40 °C	
Machine cooling / Torch cooling	Fan (AF) / Cooling unit, ext.	
Workpiece lead (min.)	16 mm^2	
EMC class	A	
Safety marking	S / CE / EAC	
Standards used	See declaration of conformity (appliance documents)	
Dimensions (l x b x h)	625 x 377 x 531 mm 24.6 x 14.8 x 20.9 inch	
Weight	36,2 kg 79.8 lb.	

[1] Load cycle: 10 min. (60 % DC ≙ 6 min. welding, 4 min. pause)

[2] Safety fuses are recommended DIAZED xxA gG. When using automatic cutouts, the "C" trigger characteristic must be used.

[3] Noise level during idle mode and operation under standard load according to IEC 60974- 1 at the maximum operating point.

[4] Ambient temperature dependent on coolant! Observe coolant temperature range!

8.3 Microplasma 105

	Plasma	TIG
Welding current (I_2)	0,3 A to 100 A	2 A to 100 A
Welding voltage according to standard (U_2)	25,0 V to 29,0 V	10,1 V to 14,0 V
Plasma current (pilot arc)	2-6 A	
Duty cycle DC at 40° C [1]		
100 %	70 A	100 A
60 %	100 A	-
Open circuit voltage (U_0)	95 V	
Ignition voltage (U_P)	12 kV	
Mains voltage (Tolerance)	1 x 230 V (-40 % to +15 %)	
Frequency	50/60 Hz	
mains fuse [2]	1 x 20 A	1 x 16 A
Mains connection cable	H07RN-F3G2,5	
max. Connected load (S_1)	5,8 kVA	2,9 kVA
Generator rating (Rec.)	8 kVA	
Cos φ	0,99	
Protection class / Overvoltage category	I / III	
Contamination level	3	
Insulation class / protection classification	H / IP 23	
Residual current circuit breaker	Type B (recommended)	
Noise level [3]	<70 dB(A)	
Ambient temperature [4]	-25 °C to +40 °C	
Machine cooling / Torch cooling	Fan (AF) / Cooling unit, ext.	
Workpiece lead (min.)	16 mm^2	
EMC class	A	
Safety marking	S / CE / EAC	
Standards used	See declaration of conformity (appliance documents)	
Dimensions (l x b x h)	625 x 377 x 531 mm 24.6 x 14.8 x 20.9 inch	
Weight	36,2 kg 79.8 lb.	

[1] Load cycle: 10 min. (60 % DC ≙ 6 min. welding, 4 min. pause)

[2] Safety fuses are recommended DIAZED xxA gG. When using automatic cutouts, the "C" trigger characteristic must be used.

[3] Noise level during idle mode and operation under standard load according to IEC 60974- 1 at the maximum operating point.

[4] Ambient temperature dependent on coolant! Observe coolant temperature range!

9 Accessories

Performance-dependent accessories like torches, workpiece leads, electrode holders or intermediate hose packages are available from your authorised dealer.

9.1 Welding torch cooling system

Type	Designation	Item no.
Cool 50 MPW50	Cooling module with centrifugal pump	090-008818-00502
RK1	Reverse cooling unit	094-002283-00000
KF 23E-5	Coolant up to -10 °C (14 °F), 5 l	094-000530-00005
KF 23E-200	Coolant (-10 °C), 200 litres	094-000530-00001
KF 37E-5	Coolant up to -20 °C (4 °F), 5 l	094-006256-00005
KF 37E-200	Coolant (-20 °C), 200 l	094-006256-00001
TYP1	Frost protection tester	094-014499-00000
HOSE BRIDGE UNI	Tube bridge	092-007843-00000
UKV4SET 4M	Hose connection set	092-000587-00000

9.2 Transport systems

Type	Designation	Item no.
Trolly 55-6 DF	Transport cart, assembled	090-008826-00000

9.3 Remote controls and accessories

Type	Designation	Item no.
RTF1 19POL 5 M	Foot-operated remote control current with connection cable	094-006680-00000
RT1 19POL	Remote control current	090-008097-00000
RTG1 19POL 5m	Remote control, current	090-008106-00000
RTG1 19POL 10m	Remote control, current	090-008106-00010

9.3.1 Connection and extension cables

Type	Designation	Item no.
RA5 19POL 5M	Remote control e.g. connection cable	092-001470-00005
RA10 19POL 10m	Remote control e.g. connection cable	092-001470-00010
RA20 19POL 20m	Remote control e.g. connection cable	092-001470-00020

9.4 Options

Type	Designation	Item no.
ON Filter TG.0004/TG.0009/K.0002	Contamination filter for air inlet	092-002698-00000
ON WAK TG.0003/TG.0004/ TG.0009/ K.0002	Wheel assembly kit	092-001356-00000

9.5 General accessories

Type	Designation	Item no.
Maxex AR/MIX 200bar 30m³ G1/4"	Pressure regulator	096-000000-00000
Maxex Hydrogen 200bar 30m³ G3/8"L	Pressure regulator	096-000001-00000
2M-G1/4"+G3/8"/DIN EN 559	Gas tube, 2 m	092-000525-00001
GH 2X1/4" 2M	Gas hose	094-000010-00001

10 Appendix

10.1 Parameter overview – setting ranges

Name	Display			Setting range		
	Code	Standard	Unit	min.		max.
Main current AMP, depending on power source	I 1	-	A	-	-	-
Gas pre-flow time	GPr	0,5	s	0	-	20
Ignition current, percentage of AMP	I St	20	%	1	-	200
Ignition current, absolute, depending on power source	I St	-	A	-	-	-
Start time	t St	0,01	s	0,01	-	20,0
Up-slope time	t UP	1,0	s	0,0	-	20,0
Pulse current	I PL	140	%	1		200
Pulse time	t 1	0,01	s	0,00	-	20,0
Slope time (time from main current AMP to secondary current AMP%)	t S1	0,00	s	0,00	-	20,0
Secondary current, percentage of AMP	I 2	50	%	1		200
Secondary current, absolute, depending on power source	I 2	-	A	-		-
Pulse pause time	t 2	0,01	s	0,00	-	20,0
Slope time (time from main current AMP to secondary current AMP%)	t S2	0,00	s	0,00	-	20,0
Down-slope time	t dn	1,0	s	0,0	-	20,0
End current, percentage of AMP	I Ed	20	%	1	-	200
End current, absolute, depending on power source	I Ed	-	A	-	-	-
End current time	t Ed	0,01	s	0,01	-	20,0
Gas post-flow time	GPt	8	s	0,0	-	40,0
Electrode diameter, metric	ndA	2,4	mm	1,0	-	4,0
Electrode diameter, imperial	ndA	92	mil	40	-	160
spotArc time	t P	2	s	0,01	-	20,0
spotmatic time (StS on>)	t P	200	ms	5	-	999
spotmatic time (StS oFF>)	t P	2	s	0,01	-	20,0
Pulse balance	bAL	50	%	1	-	99
Pulse frequency	FrE	50	Hz	5	-	15000

10.2 Searching for a dealer

Sales & service partners
www.ewm-group.com/en/specialist-dealers

"More than 400 EWM sales partners worldwide"